RCEME TECHNICAL BULLETIN

Features

NEW EDITORIAL POLICY
More reader interest

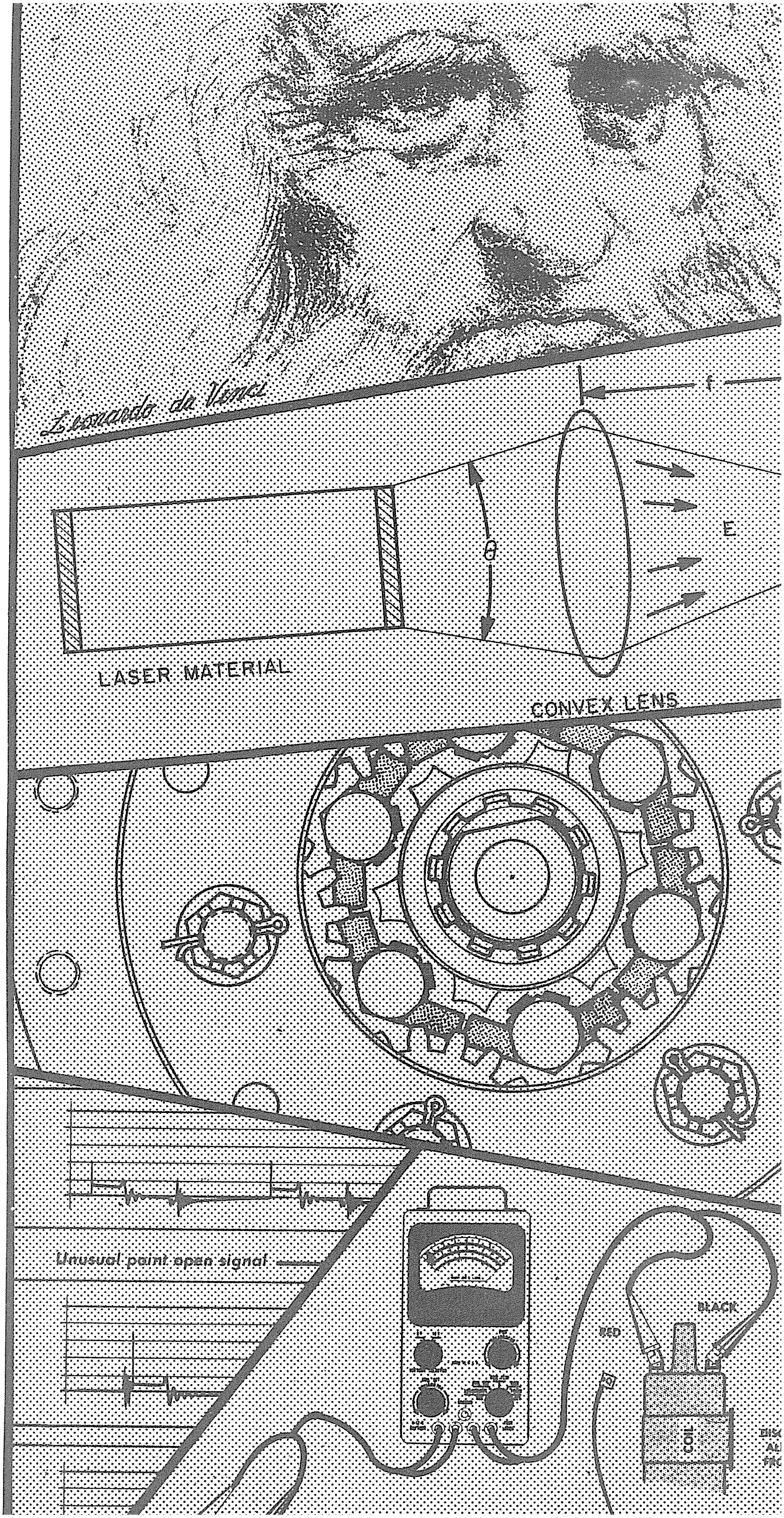
TECHNICAL FAILURE REPORTING
For quality control

REORGANIZATION OF MILITIA
What it means to RCEME

THE LASER
A modern miracle

SGT O'SWEAT IS BACK
Send him your problems

HOW DO YOU LIKE US?
See questionnaire inside



APRIL 1965
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RCEME TECHNICAL BULLETIN

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This publication is issued under the authority of Col A Mendelsohn, CD, Director of Electrical and Mechanical Engineering. The contents have been approved for publication by Lt Col JP Sherren, CD.

The Bulletin is published to assist RCEME personnel in keeping abreast of current trends in developments, to amplify or emphasize technical instructions, to circulate news of Corps and individual activities, and to provide a forum for discussion and the exchange of ideas by members of the Corps. The information and statements herein do not necessarily represent official policy and are not to be quoted as authority for action.

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NEW POLICY

Readers will notice, we hope, a slight change in the editorial policy outlined above. Although only a few words have been changed, it is expected the result will be significant. Basically we're after more contributions from more contributors.

The new policy is designed to encourage readers and associate editors to contribute articles and letters expressing personal views.

In other words, we want YOU the reader to share with us your ideas. Let's have some informed controversy; some valid constructive criticism and, most important, your suggestions on repair expedients, short cuts you have used, and the like.

All contributions should be mailed direct to:

The Editor
RCEME Technical Bulletin
c/o DEME (Army) CFHQ Ottawa

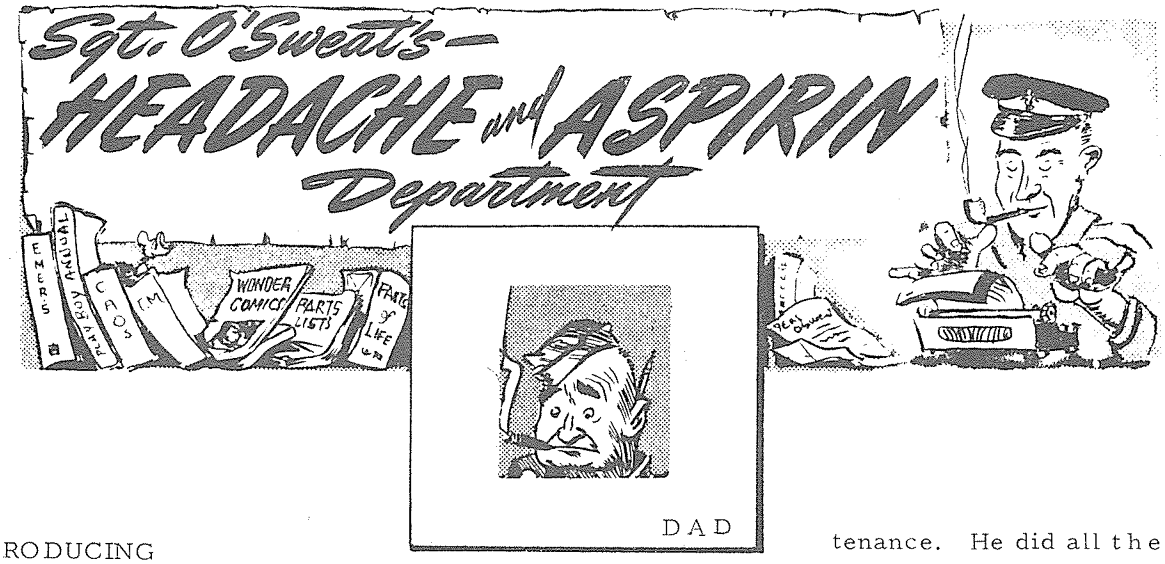
Examples of the material we hope to see in ever-increasing volume will be found at page 34 under the heading "Letters to The Editor" and at page 3 under the heading "Sgt O'Sweat Jr."

RCEME CORPS INSTRUCTIONS

The newly-named Head of Corps (see Jan 65 Bulletin) will issue a series of Corps Instructions to deal with matters within his terms of reference. The first two were issued in Jan 65: "Responsibilities of Head of Corps" and "Corps Museum".

Watch for these instructions. They are distributed to RCEME(R) officers, ROTP Cadets, and RCEME(M) units. Corps dress, customs and history are among the pertinent subjects to be covered in this series.

Sgt. O'Sweat's — HEADACHE and ASPIRIN Department



DAD

INTRODUCING

SERGEANT O'SWEAT, JR

Your editor was walking along the hall in 8 Temp Bldg, Ottawa, at the heart of the Corps - DEME - when he spied a smart looking sergeant sporting RCEME shoulder flashes.

"You lost?" I asked.

"I'm looking for DEME", says he.

"Well, you're just about there, "I replied, "the Orderly Room is just around that corner to your right."

"Oh, I'm not looking for them." Happily, he continued: "I'm not posted to DEME! I'm on leave and thought I'd look up the editor of that Bulletin you issue. I'm only a sergeant in xyz workshop so I don't see it usually, but my WO told me about it. Said they were looking for some character to answer questions submitted by readers."

"That's right," I told him, as I took him into my den. "I'm the editor along with Col Sherren and we thought it might be an idea. But why you? I don't think I got your name.

"I'm Sergeant O'Sweat BW. Friends call me "Boy Wonder." My old man was in Ordnance - DME they called it - during the war; he got to be sergeant."

"O'Sweat. That name sounds familiar - could I have run across him somewhere?"

"I guess so. If you were in this publishing racket then. He was with Capt Norris and his people on that magazine - something to do with maintenance in the Army. Yeh, that's what it was: CAM for Canadian Army Maintenance. He did all the hard work, answering questions and things -- the rest of the gang just drew pictures."

"Well, well, Sgt O'Sweat," I mused, "he was good, knew all the answers in 1943. Keen on maintenance - I read one of his early lectures on the subject just the other day. It went something like this."

"As usual he was in his favorite lecture room, the wet canteen, and on his favorite subject.

"'I remember Preventive Maintenance 'way back in the old days," he said. "Maintenance - why, you monkeys have it soft - you don't know the meaning of real Compulsory Preventive Maintenance!'

"'D'jever maintain a horse? That's maintenance that kept you steppin'. Up in the mornin' fer feedin', groomin', waterin', cleanin' harness, cleanin' stalls, haulin' feed, haulin' . . . yeh . . . and after you've put in your day of toil, and just when you're ready to eat a raw skunk - first thing when you get back to quarters is to look after your horse. Not after supper, not after you've toddled over to fix up that leave pass - but FIRST THING you water, feed and bed down your horse. Now don't talk to me about maintenance as tho' it were tough, 'cos I know better, me lads!'"

Junior had a faraway look in his eye. "That's the way he used to talk; could never forget the old days when he messed around with the cavalry."

"Well, O'Sweat, if you're half as good as your dad was, I guess you'd be OK for our job. Let's go and see if Col Sherren is busy."

Dear Sgt O'Sweat, Jr:

My father was in RCEME in the early days and he keeps telling me that they don't build equipments like they used to. However, when I tell him they certainly don't because I find my welding tips don't last any time at all, he tells me that the trouble is with me not the tips. What do you suppose he means by this?

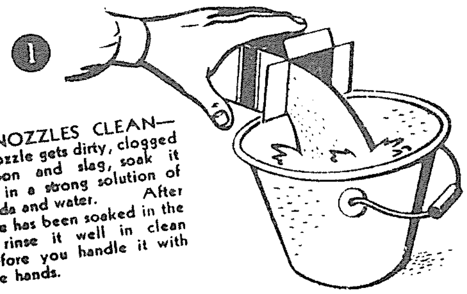
Sgt V

Dear Sgt V:

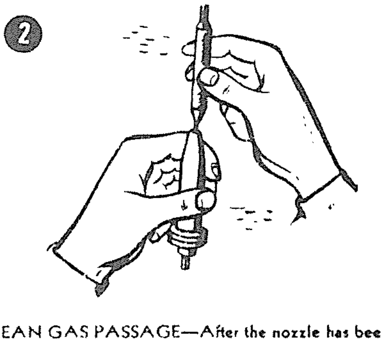
I had to ask my dad about this one and he said it was just a matter of a tradesman's maintenance of his tools. He produced a list of things to do.

If, when you've gone through this routine, the dents, nicks and burrs have not all been removed – it's time for a new nozzle.

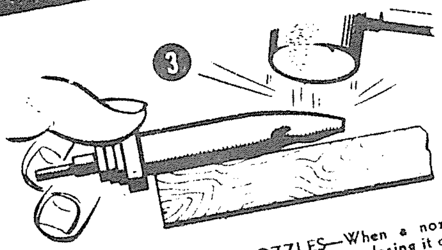
Sgt O'Sweat



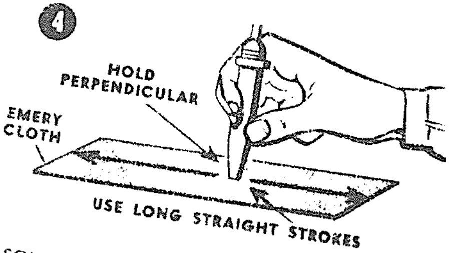
KEEP NOZZLES CLEAN—When a nozzle gets dirty, clogged with carbon and slag, soak it overnight in a strong solution of caustic soda and water. After the nozzle has been soaked in the solution rinse it well in clean water before you handle it with your bare hands.



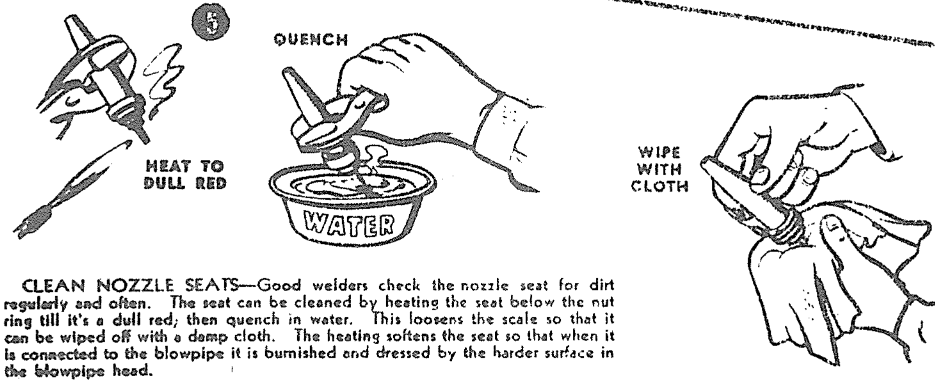
CLEAN GAS PASSAGE—After the nozzle has been soaked for several hours in the solution, the carbon deposit will be loosened. Then the gas passage can be cleaned by carefully working a drill of the correct size through the passage *without forcing or twisting the drill*. If the passage is badly clogged, use a smaller size drill to start with. The last inch of the gas passage has to be clean as a rifle bore, not bell mouthed or oversize and must be perfectly round.



STRAIGHTEN BENT NOZZLES—When a nozzle gets bent it can usually be straightened by placing it on a block of wood and tapping it very lightly in the right spots with a rawhide hammer. It's a ticklish job and one heavy blow can spoil it—so don't beat it to death.



SQUARING UP END—The flame end of the nozzle can be made ship shape by dressing it on a piece of emery cloth on a flat surface. Nozzles can be dressed over and over again—as much as ¼" can be removed from the tip before it is ready to be tossed out. To dress the nozzle, hold it at right angles to the emery cloth and rub till the edges are sharp without burrs.



CLEAN NOZZLE SEATS—Good welders check the nozzle seat for dirt regularly and often. The seat can be cleaned by heating the seat below the nut ring till it's a dull red; then quench in water. This loosens the scale so that it can be wiped off with a damp cloth. The heating softens the seat so that when it is connected to the blowpipe it is burnished and dressed by the harder surface in the blowpipe head.

Dear Sgt O'Sweat, Jr:

We have just been ordered to take a wrecker out of storage and have come up against an unusual problem. A colony of hornets have built a nest on the end of the boom. My pal, Malcolm MacFudd valiantly tried to plug up the entrance to the nest. After being stung and losing his dignity by falling off a ladder, he gave up the battle. We can't work on the wrecker until we get rid of the hornets. Any suggestions?

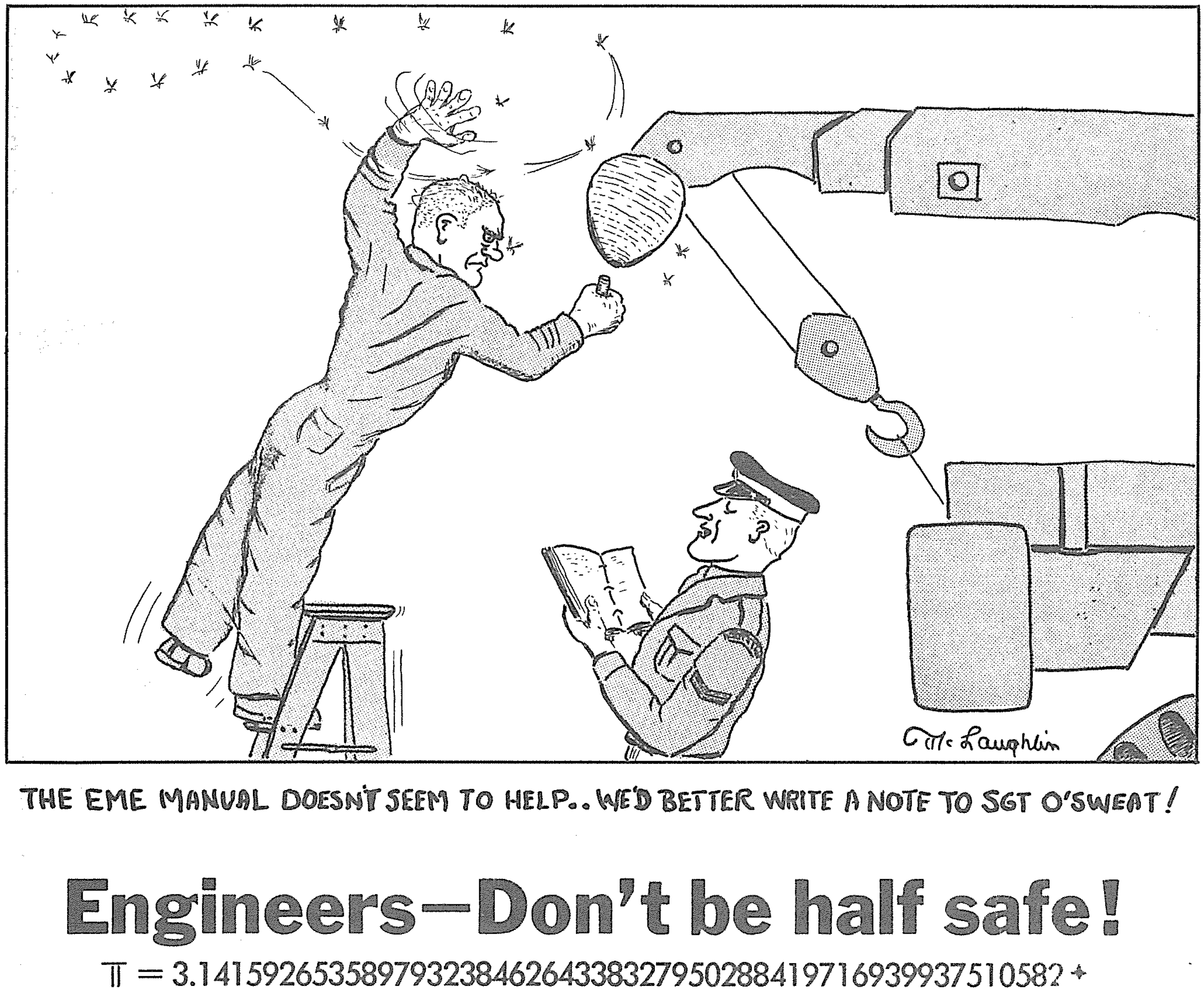
Yours sincerely,

Cpl Neville Neatby

Dear Cpl Neatby:

Why not just push the wrecker over by the CO's office window and run like hell. He will probably take some drastic action. However, there are less hazardous courses to follow. A hose rigged up to the exhaust of a jeep could be used to knock off the little beasts by directing the fumes around the nest. If you want to live more dangerously, how about waiting until evening when the hornets retire and with NO fumbling, cover the nest with a strong sack, rip it off the boom, and plunge the works into a small drum of kerosene and leave soak over night. If you have cause to correspond further on this subject, please include hospital visiting hours. Very best of luck.

Sgt O'Sweat



THE EME MANUAL DOESN'T SEEM TO HELP.. WE'D BETTER WRITE A NOTE TO SGT O'SWEAT!

Engineers—Don't be half safe!

π = 3.14159265358979323846264338327950288419716939937510582 +

Dear Sgt O'Sweat, Jr:

All the time I hear guys talking about "Murphy's Law" and I can't find anything in my physics book about it. Is it some legal business these Irish cops have thought up that I should know something about?

Corporal WJS

Dear Corporal:

It's something you should worry about OK but has nothing to do with cops and you won't find it in a physics book.

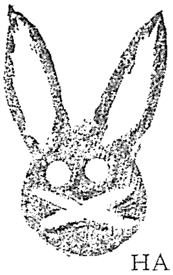
Murphy's Law states that if a thing can be assembled incorrectly someone will assemble it incorrectly. Most things are purposely designed with Murphy's Law in mind and can't be assembled incorrectly. However, you and all other tradesmen should take a long look at everything you take apart and, if there is a chance of confusion, mark the parts so that the marks match when you put them together again.

Speaking of illegalities, ask your friends if they know the difference between illegal and unlawful. The answer is that unlawful means an act that contravenes some law or ordnance whilst illegal is a sick bird.

Sgt O'Sweat

Dear Sgt O'Sweat, Jr:

I found this mark on a job in my workshop. What does it mean?



HAR, Wksp Commander

Dear HAR:

Are you kidding?

Sgt O'Sweat

Dear Sgt O'Sweat, Jr:

I notice some engine manuals detail that certain bolts will be oiled before torquing. Is this important?

-Cpl B

Dear Cpl B:

It most certainly is. With few exceptions torque values in vehicle manuals are for bolts that have been completely cleaned, dried and are entering clean dry holes. Exceptions are worn bearing bolts/nuts and cylinder head bolts/nuts which have been cleaned and lubricated with a specified lubricant. The use of lubricants will change the produced tension as much as 100 per cent, as a matter of fact using high pressure lubricants will result in as much as 80 per cent greater bolt tension over normal SAE engine oil. Thus it is most important that you not only apply torque to the nut or bolt to the required value but also use the specified lubricant when called for.

-Sgt O'Sweat

SUGGESTION AWARD

Mr Rene Couture, TO 1 in charge of 203 Workshop Bus Section, recently received a Suggestion Award and cheque for an improvement in heater/defroster performance on the Western Flyer bus.

Major CR Morgan, CD, CO 5 Coy RCEME and Area EME, Eastern Quebec Area, presenting the Certificate of Award to Mr Couture. In the background from l to r are: Cfn Gagnon, Cpl Boucher, 5 Coy RCASC, Mr Jobin, Mr Dallaire, Mr Lancup.

TRAINING NOTES

Courses Schedule 1965/66

RCEME School and CFHQ are now preparing the 1965/66 courses schedule. Be sure to watch for the 1965/66 Courses Schedule and Allotment of Vacancies which should be distributed in May or Jun.

Intermediate Management Course

RCEME 4 which was formerly known as the "Intermediate EME Course" is now called the "Intermediate Management Course". A new training standard for this course was published in Jan 65. The title was changed to describe the course more accurately. The scope of the course was re-arranged under new subject headings which are in accordance with current terminology in management training and practice.

Militia Training Instruction

Volume 1 and Volume 2 of CAMT 2-6 Militia Training Instruction have recently been issued. Two new courses are included for RCEME Militia officers. In addition to the Captain Qualifying Course, there now will be a Lieutenant Indoctrination Course and a Major Qualifying Course. DEME has started to prepare trade specifications for the following new Militia trades which are listed in CAMT 2-6:

a. Radio Technician,
b. Weapons Technician (Small Arms only),
c. Machinist Fitter,
d. Instrument Technician (Common Optical Instruments),
e. Body Repairman.

New Courses

A new course which will be called "RCEME 81 - APC Radio Maintenance Course" is being prepared by DEME and RCEME School. This course will train Master Radio Technicians Group 4 and Radio Technicians Group 3 in the maintenance techniques which are special to the AN/VRC 12 and AN/PRC 25 families of radio sets. It is planned to start scheduling this course in the 1965/66 training year.

Trades Tests - Metals Technician

The following three new trade tests have recently been issued:

a. Metals Technician Gp 2 to be used for:

(1) Upgrading Metals Technician Gp 1 to Metals Technician Gp 2; and

(2) Converting Welders Gp 2 to Metals Technician Gp 2; and

(3) Converting Body Repairman Gp 2 to Metals Technician Gp 2.

b. Conversion of Body Repairman Gp 3 to Metals Technician Gp 3.

c. Conversion of Welders Gp 3 to Metals Technician Gp 3.

SUGGESTIONS RECEIVED

The following suggestions have been submitted by military or civilian personnel in the Corps. Some will be adopted and many will be 'shot down' for various reasons. However, they are the best evidence that RCEME people are constantly using their heads.

These files were received in DEME during February and March. The publication of the particulars here does not in any way imply their acceptability.

Suggestor	Suggestion
Mr Jean Paul Bergeron 202 B/W/Shop	Inspection aid, diesel injector fuel tips
Mr Wilfred G Higgs 27 COD Wksp Br	Protector for transmission control valve, throttle and shift lever
Cfn RG Charron RCEME School	Modification to C10 adapter

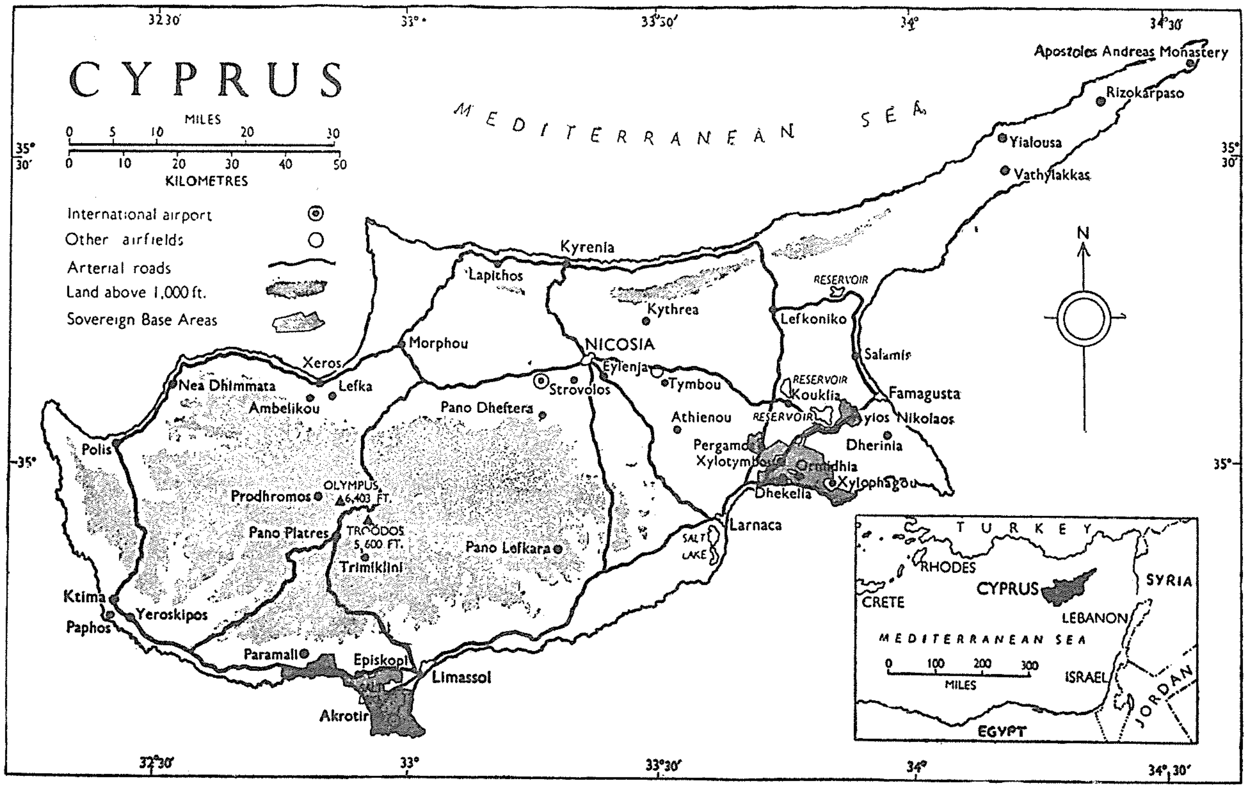
CYPRUS

By Capt FA Ouimet

On Friday 13 March 1964 the curtain was raised on operation SNOW GOOSE – code word for Canadian participation in the UN Cyprus peace keeping mission. After numerous Qui Vive Exercises with the famous Vandoos (1R22eR) and at least three dozen innoculations the RCEME Increment personnel were summoned to Camp Valcartier to join the Regiment prior to its departure for the Island of Cyprus.

All 1R22eR technical equipment was inspected by teams of technicians from 5 Coy RCEME. Top priority was given to the repair and replacement of NS equipment. The teams completed their inspections on schedule and the Unit was assured that all of its equipment was in serviceable condition. Receptions, clearances and briefings were highly organized and it was apparent that the lessons learned on previous exercises were paying off. All RCEME Increment personnel were screened at this stage to ensure that there were no compassionate cases. Many of the technicians, it was discovered, had been through previous UN operations and were quite familiar with current procedures. UN blue berets, distinguishing badges and winter parkas were also issued at this stage. The weather at this particular time was foul and everyone dreamed of the Blue Mediterranean and the accompanying summer weather.

By Friday afternoon the advance party of the force left by RCAF Yukon aircraft. It was followed during the next several days by intermittent flights of similar aircraft plus several of the new Hercules type. The loading of the jeeps, trailers and half dozen Ferrets aboard the aircraft plus tons of other equipments went along smoothly and only minor problems were encountered. The RCEME Increment at this stage was split up between different flights in accordance with the Standing Operating Procedures. A small group of vehicle technicians was despatched by road to Halifax with the heavier transport vehicles belonging to the



Regiment. The convoy stopped at Camp Gagetown where it joined the RCD Recce Squadron for the final leg to Halifax and embarkation on HMCS Bonaventure. The weather continued stormy and cold.

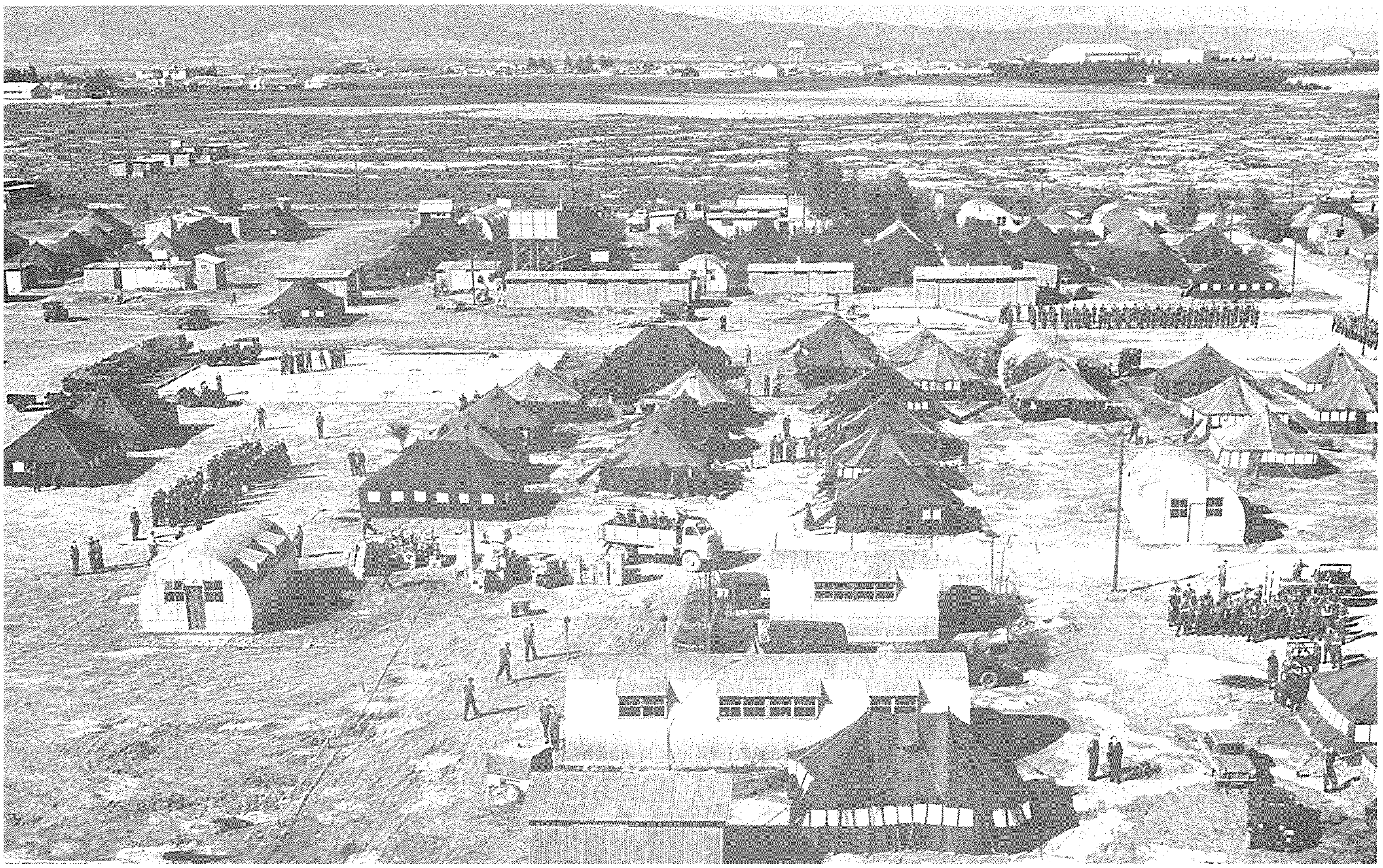
The air flights departing from Ancienne Lorette airport just outside Quebec City commenced 13 Mar and continued until approximately 18 Mar by which date the bulk of the force had arrived in Nicosia, Cyprus. Those fortunate enough to travel by Yukon found the trip less tiring than the personnel who travelled by Hercules. All flights landed at the RCAF base in Marville, France, where hot meals were served and aircraft refuelled during the 2 to 3 hour stopover. The appearance of the troops dressed in parkas and blue berets brought curious looks from the French civilians employed at the air base. Not that they hadn't seen blue berets before but they had not seen troops wearing parkas. This was a novel dress to them.

The flight from Marville to Nicosia lasted approximately five hours. Many had the opportunity to see Nice, Rome, Capri, Southern Italy, Greece and numerous Islands, all from approximately 19,000 feet and generally between clouds.

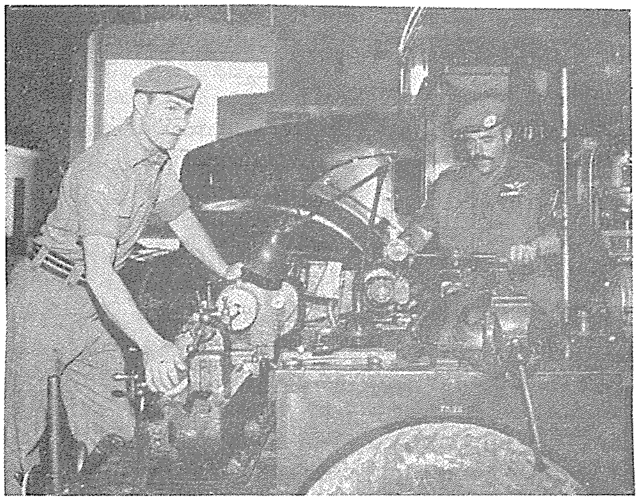
The advance party landed at Nicosia on 14 March followed shortly after by the bulk of the main force. By the 17th the RCEME Increment less those on the Bonaventure had arrived in Cyprus. The force moved into Troodos Camp which is adjacent to the RAF base in Nicosia. The sunshine and warm weather that was so much anticipated while in Camp Valcartier was not yet to be experienced; until mid-May it rained almost daily and for those under canvas the mud did little to help matters. The nights were cold and damp with the temperature dropping to the low twenties. The Troodos Mountains remained snow-capped until the end of April.

Those who travelled aboard the Bonaventure encountered very rough seas from the outset and even experienced a dust storm originating from North Africa while they were crossing the Mediterranean.

On arrival at Famagusta, a small sea port located at the Eastern section of the Island of Cyprus, the Bonaventure dropped anchor approximately two thousand yards off shore. It was too large to enter the harbour safely, therefore the unloading was done with tenders.



Aerial view of Troodos Camp with the RCEME Increment hangar shown in the background, top right.



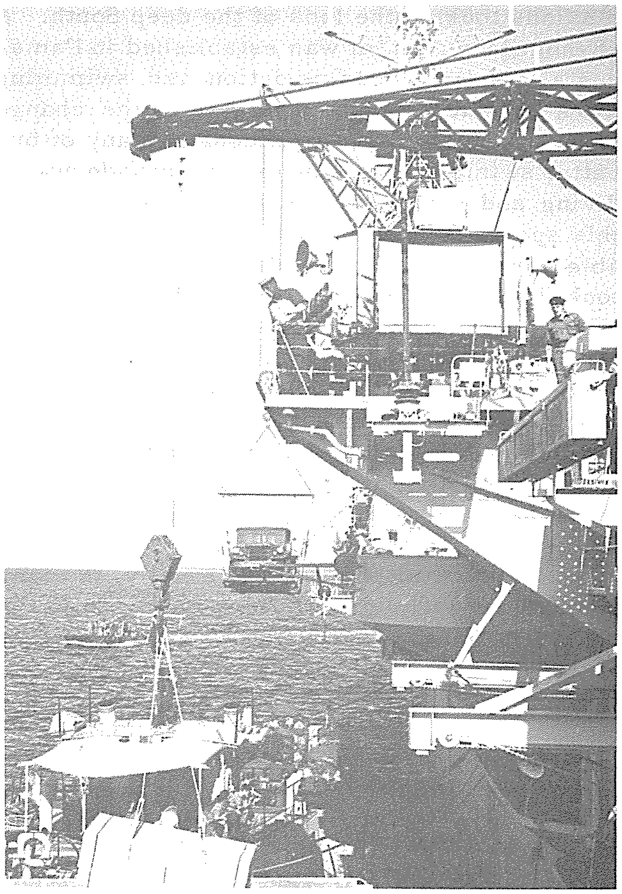
Integration -- Cpl Gagnon, RCEME, working with Cfn Emery, REME, in the hangar, Troodos Camp.

The job of unloading started on the morning of 30 March ending by evening 31 March. All the vehicles were formed up in convoy at the docks and driven to Troodos Camp under RCD Ferret escort.

While waiting for the Bonaventure to arrive with the vehicles and stores, time was spent searching for suitable workshop accommodation. Contacts were made with the RAF and within a short time a medium size hangar was located and made available. This hangar was large enough to allow the RCOC Increment to move in and as a result spare parts service was never better. Indents were quickly processed and this helped to give top service at all times.

The RCEME Increment at this stage was split into two sections. One section under the control of WO2 L Boisvert worked at the Increment hangar on strictly Canadian vehicles. The other section under the supervision of the Master Vehicle Technician (S sgt JJ Goodfellow) was employed with the British 16 Para Bde Workshop commanded by Maj RH Lee. This latter section had six vehicle mechanics, the welder, body repairman and two master radio technicians. The machine lorry, welding and tels repair vehicles became part of the workshop and provided valuable increase in resources. This section worked on common user equipments issued to the British and Canadian contingents, eg, Ferrets, Bedfords, Humber APCs, Land Rovers, and C42 Radio Sets. This arrangement proved very satisfactory. The integration was not difficult and many solid friendships were established.

It soon became apparent that the bulk of the work would be on vehicles, especially the Ferrets. The RCD Squadron was operating in an area of approximately 1100 square miles which on Cyprus roads meant increased maintenance by the crews especially those employed in the Kyrenian mountains. The unit vehicle mechanics averaged one "in situ" repair call per day. The average round trip for such a repair was about seventy-five miles which on mountain trails meant up to four hours driving, apart from time spent on the repairs. Because of these conditions and to provide more flexibility, it was necessary to increase the RCEME portion of the RCD establishment. By July there had been sufficient milage accumulated to warrant base overhaul of all the Ferrets.



Unloading vehicles from the Bonaventure into tenders outside Famagusta harbour.

Canadian Forces photographs

This was arranged through 48 Command Workshop REME located at Dhekelia in the British Sovereign Base Area. A suitable program was worked out and by late July the first two vehicles entered the workshop. To keep the RCD Squadron up to battle strength two Scout Cars were drawn from British sources until the program was completed.

The wear and tear on 1R22eR wheeled vehicles was just as great, and frequent '2208' inspections' were required to ensure serviceability. The most common repairs were on the M38A1 jeep front end assemblies. Getting used to the British Bedfords, Humbers and Land Rovers was another problem. Peak driver maintenance had to be stressed and enforced at all times, otherwise the vehicles would have rattled apart on Cyprus roads. The RCD and 1R22eR vehicle mechanics under Sgt CR East and JLE Comeau were well organized and gave valuable service under the most adverse and frustrating conditions.

The sunshine and summer finally appeared in May when parkas were exchanged for shirts and rolled sleeves. By now the troops were accustomed to outdoor living and complexions took on the look of the deep South. A 48-hour leave center was established in Famagusta where accommodation and swimming were excellent. This was a welcome change from the dusty plains of Nicosia. Many of our better swimmers became experts in underwater diving and took every occasion to indulge in this sport. A leave center in Beirut was available for those on seven days leave and many took the opportunity to visit Jerusalem and other Middle East tourist spots.

Much valuable experience is being gained by the Corps in Cyprus. For one thing, this operation has shown that it is feasible to integrate Canadian technicians into a British workshop. And, too, it has given the men of the force a better picture of field operations and the problem of keeping fighting vehicles on the road - no matter how rough. Finally, to many (probably most), it must be a matter of personal satisfaction and pride to have been part of a UN peace-keeping operation.

EXCERPTS FROM "SPANNER SPEAKS"

On January 11, a new M113A1 course for RCEME vehicle mechanics within the Brigade started at the Workshop. Candidates on this course are Sgt Lawrence, Sgt Rindress and Sgt Waite, 1 RCR, Sgt Stevenson and Cpl Hayes, 1 PPCLI, Cpl Garwin, R22eR, Cpl Portelance, FGH, Cpl Newel, Cpl Boelher, Cfn Lescadres and Carter from 4 Fd Wksp RCEME.

Pat Keogan and Larry MacDonald, sons of WO2 Keogan and Ssgt MacDonald left for Canada on January 4 to begin careers in the army. Our congratulations go to both these young men and their fathers.

Posting instructions have just been received for Cfn PE Bellefontaine and T Gibson, sending them off to the Middle East for a year of sun and sand.

The second six week M113A1 course held at 4 Fd Wksp for RCEME vehicle mechanics, began last week. Candidates on this course are WO2 JL Trinca, 1 RCR, WO2 D Dyke, 2 RHC, Sgt CD Bellemare, B Coy 3 R22eR, Cpl BW Wright and SN Poytress, 1 PPCLI; WO2 TC Hooper, Ssgt DG Bridsell, GD Humphreys, JC Mombourquette and Sgt LA Maude all of 4 Fd Wksp RCEME.

Also learning some of the finer points of the M113A1 during a three day workshop officers' orientation course are Major WG Svab and Capt H Dick of the Canadian Detachment 23 Base Wksp RCEME, Major B Yarymowich and Lt J Davies, CBUE, Capt NE Laviolette, HQ 4 CIBG, Capt DV Hill, 1 Tpt Coy, Capt PM Graye and WO1 J George from the FGH.

During the holiday season two teams skipped by members of the workshop were in the finals of the B event of the Fort York Yuletide Spiel. The winning rink was skipped by Capt Rochefort ably assisted by Capt JDI Jones, Ssgt DG Birdsell and Capt FG Hutson. Runner-up was the rink skipped by L/Cpl R Carey. Other members were Sgt Storeshaw, 4 OFP, Ssgt L Walker, 4 Fd Wksp and Cfn Gebhart from 1 Tpt Coy.

-The Beaver

HISTORICAL GLIMPSES

Cyprus was first occupied by the Egyptians in 1450 BC, after which it was ruled by Assyrians, Persians, Ptolemies, Romans, Byzantines, Richard I, King of England, Templars, Lusignans and Venetians respectively up to 1571. In that year the Turks captured the Island and it became a Turkish province until the British occupation in 1878. In 1925 Cyprus became a British Crown Colony under a Governor.

MANAGEMENT TRAINING - WHERE DO WE GO FROM HERE?

By Major HW Chapman, OC Management Company, The RCEME School

Management training, after considerable development and experiment during the period 1955-1959, was adopted as an integral part of RCEME career training for officers, warrant officers and senior NCOs.

This training results from an appreciation of the requirement to develop to the maximum managerial skills at all supervisory levels within the Corps. It is based on the growth and widespread recognition of both an increasingly accepted concept of management, ie, what management is, and an increasingly numerous and sophisticated array of associated management techniques.

On the surface it would appear that as a Corps we are not only aware that there is a revolution in managerial development and its application, but are actively participating in it. This revolution is partly a cause of and partly a reflection of an accelerating rate of technological advancement. It is said that: * "The rate at which knowledge is accumulating will double by 1970 or so. More knowledge has been generated since World War II than in the entire previous history of mankind - and most of the scientists who ever lived are alive now."

Managerial efficiency is evaluated by subjecting performance to objective scrutiny. The means now exist to subject performance to an increasingly more searching scrutiny and evaluation than ever before was possible. In line with this is an increasing demand to produce more efficiently or give way to someone who can, and inefficiency is becoming increasingly more difficult to conceal as it becomes more easy to detect.

It was noted above that on the surface we as a Corps appear to be actively participating in this managerial revolution. I say "on the surface" because at the present moment we do not have a realistic appraisal of the extent to which our management training has been applied successfully throughout the Corps.

By an overwhelming majority students of all ranks have been enthusiastic about the management training they have received. They have also demonstrated in the discussions, exercises and projects which they have been involved in as students that they possess a high capacity to apply successfully the concepts and techniques taught. Whether or not this interest and capability has been translated into action on the job is something we hope has happened but at present have not attempted to study. It is now 1965, and the time for such evaluation is here, if indeed not overdue.

Therefore, in the near future all RCEME management-trained personnel, from field officer to senior NCO, will be asked to provide us with the information with which to assess our RCEME management training program. This survey will be in the form of a questionnaire in which you will be asked to indicate not only what areas of instruction you have found most useful on the job, but whether the amount of instruction given in various subjects has the proper balance.

In addition you will be asked to advise in brief of any improvements in procedures, techniques, methods or personal relationships which have resulted from the management training received. By this means and with your assistance we hope not only to consolidate or improve our training but also to evaluate the extent of its application in the Corps.

Such information may also indicate what direction further development may take. The requirement for further liaison; the requirement for work study officers and technicians; and the application on a more energetic basis of certain techniques are only some of the areas which may be indicated for further development.

Your co-operation is requested. We cannot stand on our past laurels in a rapidly changing world. Your assistance may help determine in which direction we will go forward.

Although this article is directed primarily at personnel who have attended management courses at The RCEME School, it should prove of interest to all RCEME personnel.

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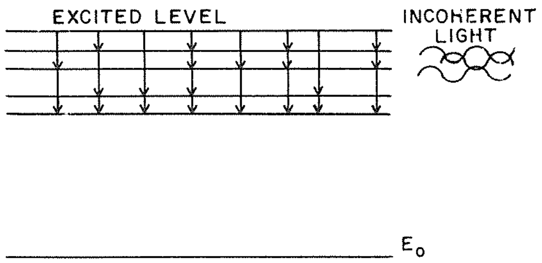
* "The Accelerating Rate of Change" - FACTORY MAGAZINE, Jun 64.

THE LASER

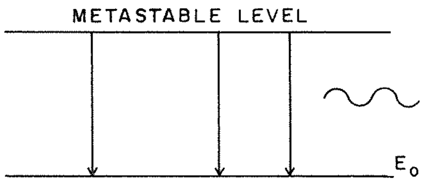
By Maj BC Clerke, CD

The LASER - Light Amplification by Stimulated Emission of Radiation - uses the phonomena of stimulated emission to amplify waves in the visible and near visible region of the spectrum.



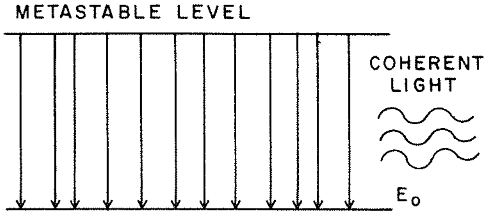
a.

ELECTRONS FALL TO
METASTABLE LEVEL
EMITTING INCOHERENT
LIGHT



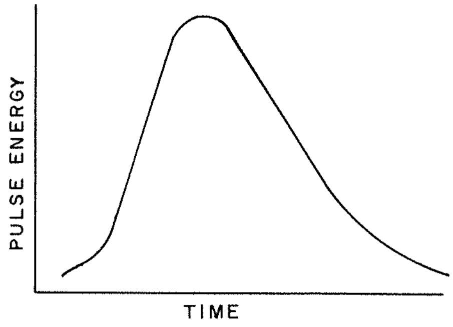
b.

FEW ELECTRONS FALL
SPONTANEOUSLY FROM
METASTABLE LEVEL TO
GROUND LEVEL EMITTING
PHOTONS OF LIGHT OF CORRECT
ENERGY AND FREQUENCY

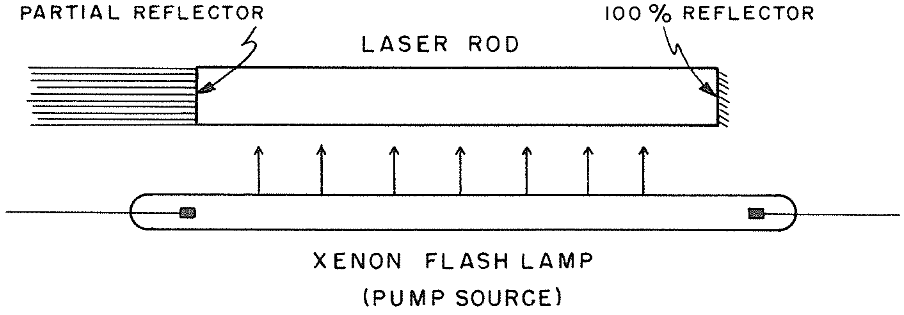


c.

AVALANCHE BUILDS UP
STIMULATED BY PHOTONS IN b.



a.b.c. LEAD TO LASER PULSE



SCHEMATIC DRAWING OF LASER

A typical LASER is composed of aluminum oxide (synthetic ruby) in which a few aluminum atoms have been replaced by chromium atoms. It is in the chromium atoms that the LASER action occurs. The LASER rod has reflecting mirror surfaces at each end but one end is only partially silvered to allow the LASER beam to leave the rod. Both mirror surfaces must be parallel and coaxial.

A suitable light source such as a xenon flash tube fired by a condenser bank supplies the pumping energy, or the energy that raises the electrons of the chromium atom to the excited state from which they fall back spontaneously to a semi-stable or metastable state. The metastable electrons tend to remain in this state but as stated later can be stimulated to fall back. A few that fall back spontaneously from the metastable level emit photons that have the correct energy to act as the initial stimulating photons. These stimulating photons may go at any angle. Some will escape from the rod but some will travel along the axis causing more electrons to fall back emitting more photons of the same energy and frequency. Thus the LASER pulse builds up coaxially and escapes through the unsilvered portion at one end of the rod.

It must be noted that the photons travelling down the rod are reflected between the silvered surfaces and some escape. But avalanches build up over the approximate one millisecond the flash lamp pulse lasts, developing into the LASER pulse each time the xenon lamp is fired. Amplification is achieved because each photon emitted by the metastable electrons has the same energy, is at the same frequency, and will be in phase with the stimulating photons.

The intense white light of the xenon flash tube contains high concentration of ultraviolet and green light. This light supplies the pumping energy but a large portion is absorbed by the ruby crystal and causes heating. This heat must be removed, and cooling in the form of forced gas, water or liquid nitrogen is used to improve performance.

COHERENT LIGHT - light waves of the same frequency and phase.

INCOHERENT LIGHT - light waves of the same or different frequency but with no particular phase relationship.

The chief drawback to the LASER using chromium as the active element is that the terminal energy level by LASER action is identical to the ground state. The ground state is usually fully populated with electrons and depopulation requires great expenditure of energy which makes it very difficult to operate the ruby LASER except in pulses. Active elements other than chromium can be used with a suitable host element but these also present difficulties.

Gas LASERS

Up to this point the discussion has been on pulsed LASERS. There is, however, a continuous LASER possible and this is the gas LASER. An example is the helium neon gas mixture LASER and the action is briefly as follows. The helium gas is used to convert electrical energy into light, producing a visible gas discharge in the tube. Some of the helium electrons are raised to a higher energy level by the electric excitation and then some of these electrons in falling back to their original level give off photons of light. These photons are absorbed by the electrons in the neon atoms which are then raised to a higher level. These excited electrons are then stimulated or triggered to fall back to an intermediate level giving off coherent light. Electrons later fall back to the zero level in intermediate stages of no particular order with spontaneous emission of light which is incoherent.

Useful Areas

There are a number of areas where the LASER may be useful and a few examples will be given to indicate what can be done and to indicate potential for this fascinating scientific achievement.

Micromachining can be done with the LASER. The LASER beam is focused on the sample in a very bright, concentrated spot. The intensity of the LASER spot is sufficient to cause the small areas of the sample to reach vaporization temperature and fine micromachining is accomplished. The LASER can also be used to produce small diameter holes in hard-to-work materials such as tungsten. A single 10-joule burst will produce a 0.022-inch hole in a sample of tungsten 0.020 inches in thickness.

The LASER can be used for cutting and fracturing on small scale operation. As an example two 5-joule bursts on different areas of a two carat industrial diamond cut the crystal into three pieces. The surfaces where the diamond split were almost perfect planes even though the LASER had not been focused near any particular cleavage plane.

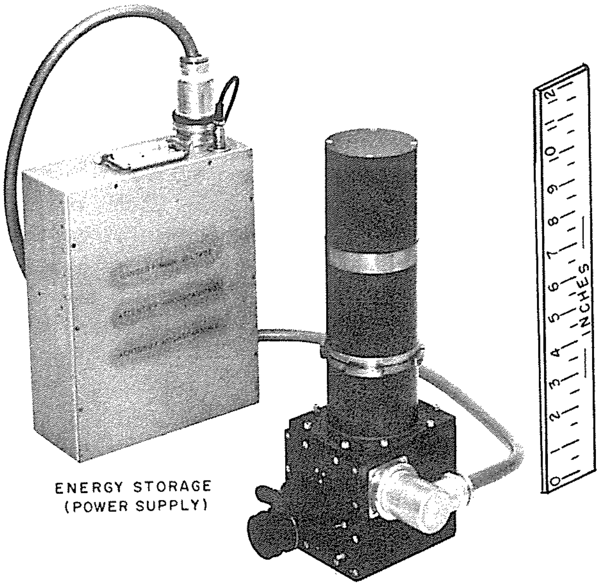
In microwelding the operation is similar to micromachining except that the beam energy is not allowed to vaporize the material. This can be done by reducing the beam energy, using longer focal length lenses, or by moving the sample slightly off the focal plane of the lens. The only LASERS now capable of melting materials are pulsed devices thus restricting the operation to spot welding techniques.

The advantages of this type of welding include; no physical contact; very small temperature rise to the surrounding region; a wide range of dissimilar materials may be welded; and welds may be made in the air or under controlled atmosphere conditions. Examples of LASER welding are lead wires from the silicone slab of a transistor, tungsten wires welded to nickel wire, and welding thermocouples. These welds are very small; for example the thermocouple weld is about 1/5 the size of a pin head. The above types of welds can be made with a LASER beam energy of less than 1-joule.

The LASER in the field of range-finding has progressed to at least the engineering model stage and has been successfully demonstrated. With the pulsed LASER a pulse is fired at a target and reflected light is returned to the range finder, detected, and, with the use of a suitable counter and knowing the speed of light, the range can be determined. Accuracies within a few yards up to 10,000 yards have been achieved. Pulses in the order of six per minute with intensity approximately ten times that of the sun may be used. Some caution will have to be exercised as the beam could be harmful to humans - with the chance of tissue damage at short distances and the possibility of eye damage at longer ranges.

Looking at somewhat longer ranges the LASER could have some interesting uses. The LASER might be used to transmit power to satellites and space scientists at least indicate it might be possible to link planets by a LASER communication system. This is pretty high thinking - other possibilities in this line will be left to the readers imagination.

Back on earth again there is another interesting field for the LASER and this is in medicine. A group of Boston doctors have successfully used LASER beams to dissolve skin cancer in humans and animals. The LASER has also successfully been used to prevent retinal detachment, a condition of the eye which can cause blindness by the light sensitive tissue or retina ripping and detaching from the next eye layer. The LASER action is to actually weld the retina in place. No anaesthetic or eye immobilization is required as the time required is only a few thousands of a second. The possibility exists, however, that the LASER beam may cause cell ionization and subsequent tissue death which means that caution is indicated and more experimentation is required.



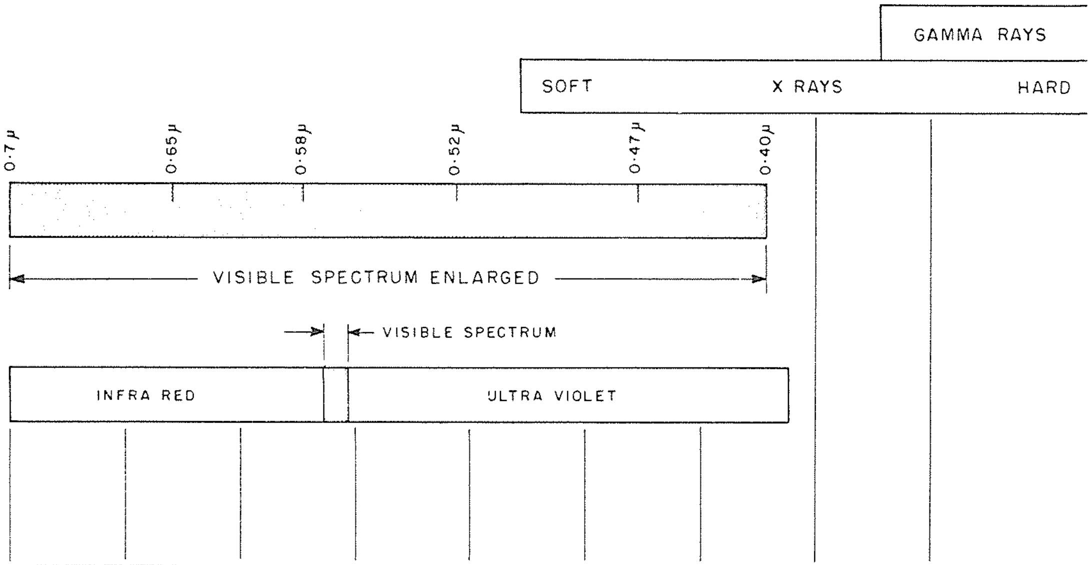
LASER Range Finder

Total wt vehicle mounted 50 lb.
Man portable 30 lb.
Range 300 - 10,000 meters.

Photo courtesy Instronics Ltd

The development of the LASER has been rapid, with research spreading over a wide area. Advances to date have been to a great extent restricted to the research and experimental level with some breakthrough as noted in this article. Although the so-called death ray may be some time away particularly in the atmosphere it is certainly reasonable to assume that rapid advances will be made in the fields of industrial engineering, communications and medicine.

And now, to those of you still with us, here is how it all started; in other words —



Frequency in Mc/s	10^6	10^7	10^8	10^9	10^{10}	10^{11}	10^{12}	10^{13}	10^{14}
Wavelength λ in Microns μ	300	30	3	0·3	3×10^{-2}	3×10^{-3}	3×10^{-4}	3×10^{-5}	3×10^{-6}
Wavelength λ in Angstroms Å	3×10^6	3×10^5	3×10^4	3×10^3	3×10^2	30	3	0·3	3×10^{-2}
Wavelength λ in Cm	3×10^{-2}	3×10^{-3}	3×10^{-4}	3×10^{-5}	3×10^{-6}	3×10^{-7}	3×10^{-8}	3×10^{-9}	3×10^{-10}

The LASER is concerned with the characteristics of atomic structure that make it possible for an active element in or mixed with, a host element to produce, under certain conditions of stimulation, a pulse or beam of coherent high intensity light travelling along a sharply defined parallel path.

The above information gives an indication of our region of interest. An attempt will now be made to show what makes LASER action possible and how it operates. To do this the atom will be considered with regard to electrons and energy levels.

In the early part of this century Planck considered the various frequencies in the continuous spectrum of a radiating black body to be emitted by oscillating electrons forming an assembly of harmonic oscillators of all conceivable frequencies and, according to Maxwell, the oscillating electrons should continuously lose energy by radiation and gradually diminish in amplitude similar to a pendulum.

However, a pendulum of any given frequency could swing with any desired amplitude. Therefore Planck had to assume that the oscillator could possess only certain stable values of energy and that it could change energy only in discontinuous steps gaining or losing the amount $h\nu$[*] of energy. This implies the electron does not lose energy while vibrating in the stable energy states of o, $h\nu$, 2 h etc. Planck's constant "h" (6. 62 x 10^{-27} erg-sec) is a fundamental constant of nature and ν is the frequency in cycles per second.

There is, however, still a problem because discontinuous emission was supposed to be in the form of an electromagnetic wave. If we assume that an atom on a distant star emitted a quantum of energy and this energy then spreads on a spherical wave front of increasing radius "R" it is inconceivable that an atom could absorb this energy (which has spread in the course of thousands of years) in a tiny fraction of a second.

To overcome the absorption problem Albert Einstein assumed that light and in fact any electromagnetic radiation emitted by atomic constituents are not emitted in the form of spherical waves but rather in the form of packages of energy which he called "PHOTONS". He assumed the photon energy to be given by $E = h\nu$ where E is the energy in ergs,

[*] ν = greek letter nu

h is Planck's constant and ν is the frequency. Also $E = h\nu = mc^2$ or $h\nu = mc.c$ where c is the speed of light (3×10^{10} cm/sec) and $mc = P$ the momentum of the photon; therefore it follows $h\nu = Pc$ or $P = h\nu/c$.

We have thus shown that according to Planck and Einstein an electron can absorb or emit a quantum of energy.

In 1913 Bohr stated the theory that atoms did not radiate energy of themselves but existed in a series of definite non-radiating states or levels of energy. Each atom has a lowest energy state called 'ground state' and other levels called 'excited states' because the atom can only attain them if one or more of its electrons is excited by either violent impact, heat or electromagnetic radiation. Based on Planck's constant, Bohr made the assumption that the total energy of the electron is restricted to certain discrete amounts. This is equivalent to saying that an electron can revolve only at certain allowed distances from the nucleus. Thus it can be said if an electron loses suddenly a quantum of energy $E = h\nu$ that the emitted frequency is determined by the difference between the initial and final energy levels of the electron, ie, $\nu = \frac{Ei - E.}{h}$ The case for absorption can be considered in a similar manner except of course the electron is raised to some higher energy level.

The foregoing should not be considered as a rigorous explanation but is sufficient to show that an electron may absorb or emit a photon or quantum of energy, and in the process change its energy level. The frequency will be determined by the initial and final energy level to which the electron is lowered or raised. It should be noted that the electron can be raised through more than one energy level at a time depending on the energy of the absorbed photon. Similarly the electron can fall back one or more levels at a time depending on the energy of the emitted photon for each jump. It can thus be seen that a number of electrons falling to lower energy levels in different steps would produce incoherent light, as the photons would be at different frequencies; and electrons falling through the same number of energy levels in one step could produce coherent light, as the photons would be at the same frequency if in-phase relationship can be attained.

A phenomena can occur which makes the LASER possible. Electrons can be raised to excited states and can fall back spontaneously to a semi-stable or, perhaps more correctly, to a metastable state such that when a photon of radiation of exactly the right frequency triggers or stimulates the electron it can cause the electron to fall to a lower level adding a photon identical to and in phase with the one that stimulated the emission. We thus have amplification by stimulated emission. The radiation that causes the stimulated emission must have the same frequency as the radiation the electron will give off as it falls to the lower energy level. This is LASER action and the radiation is of course coherent.

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Two angel technicians were sky-diving side by side and in general trying out their newly acquired wings.

First Angel Technician. "And how did you manage to earn your wings so young?"

Second Angel Technician. "That was easy; by trying to open a drum of naphtha with a steel rod and a hammer. How did you earn yours?"

First Angel Technician. "Along similar lines. I jammed the interlock on the transmitter box of the CM Radar. I do, however, have one advantage in that I was awarded a set of supercharged wings. They are the latest thing, you know, for over zealous radar technicians.

REORGANIZATION OF THE MILITIA - WHAT IT MEANS TO RCEME

The Minister of National Defence has assigned the following roles to the Militia:

Primary Role. The Militia will be required to support the Regular Army and form the framework for logistic and special units which are not provided in peacetime.

Second Role. The Militia will provide a training force which will be required in time of emergency to support the Field Force.

Third Role. Internal Security. The Militia will be required to provide trained officers and men for the guarding of key points, internment camps and like duties.

Fourth Role. The Militia will assist in fulfilling the Army's National Survival responsibilities.

A commission headed by Brigadier ER Suttie, CBE, DSO, ED, studied the organization of the CA(M) and submitted a report to the Minister. The CA(M) will be subsequently reorganized to enable it to fulfil its roles. The numerical strength of the Militia will be reduced to approximately 30,000 all ranks based on an establishment of about 42,000.

A new establishment has been produced for RCEME Technical Squadrons. There is no establishment for a Technical Regiment al-

RCEME SQUADRONS IN THE CA(M) ORDER OF BATTLE

Unit	Service Battalion	Location
Eastern Command		
20 Tech Sqn	Halifax Service Battalion	Halifax
21 Tech Sqn	Moncton Service Battalion	Moncton
Quebec Command		
A Sqn 2 Tech Regt	1 Montreal Service Battalion	Montreal
B Sqn 2 Tech Regt	2 Montreal Service Battalion	Montreal
22 Tech Sqn		Cap de Madeleine
25 Tech Sqn		Arvida
42 Tech Sqn	Quebec City Service Battalion	Quebec City
Central Command		
28 Tech Sqn	Ottawa Service Battalion	Peterborough
A Sqn 4 Tech Regt	1 Toronto Service Battalion	Toronto
B Sqn 4 Tech Regt	2 Toronto Service Battalion	Toronto
A Sqn 5 Tech Regt	Hamilton Service Battalion	Hamilton
30 Tech Sqn		St Catharines
33 Tech Sqn		Sudbury
34 Tech Sqn		Sault Ste Marie
35 Tech Sqn	Port Arthur Service Battalion	Port Arthur
39 Tech Sqn	London Service Battalion	Windsor
Western Command		
A Sqn 7 Tech Regt	Winnipeg Service Battalion	Winnipeg
37 Tech Sqn	Regina Service Battalion	Saskatoon
38 Tech Sqn	Edmonton Service Battalion	Edmonton
A Sqn 8 Tech Regt	Vancouver Service Battalion	Vancouver

though in some cases squadrons are designated as A Squadron, X Technical Regiment.

The following units will be reduced to nil strength and transferred to the Supplementary Order of Battle:

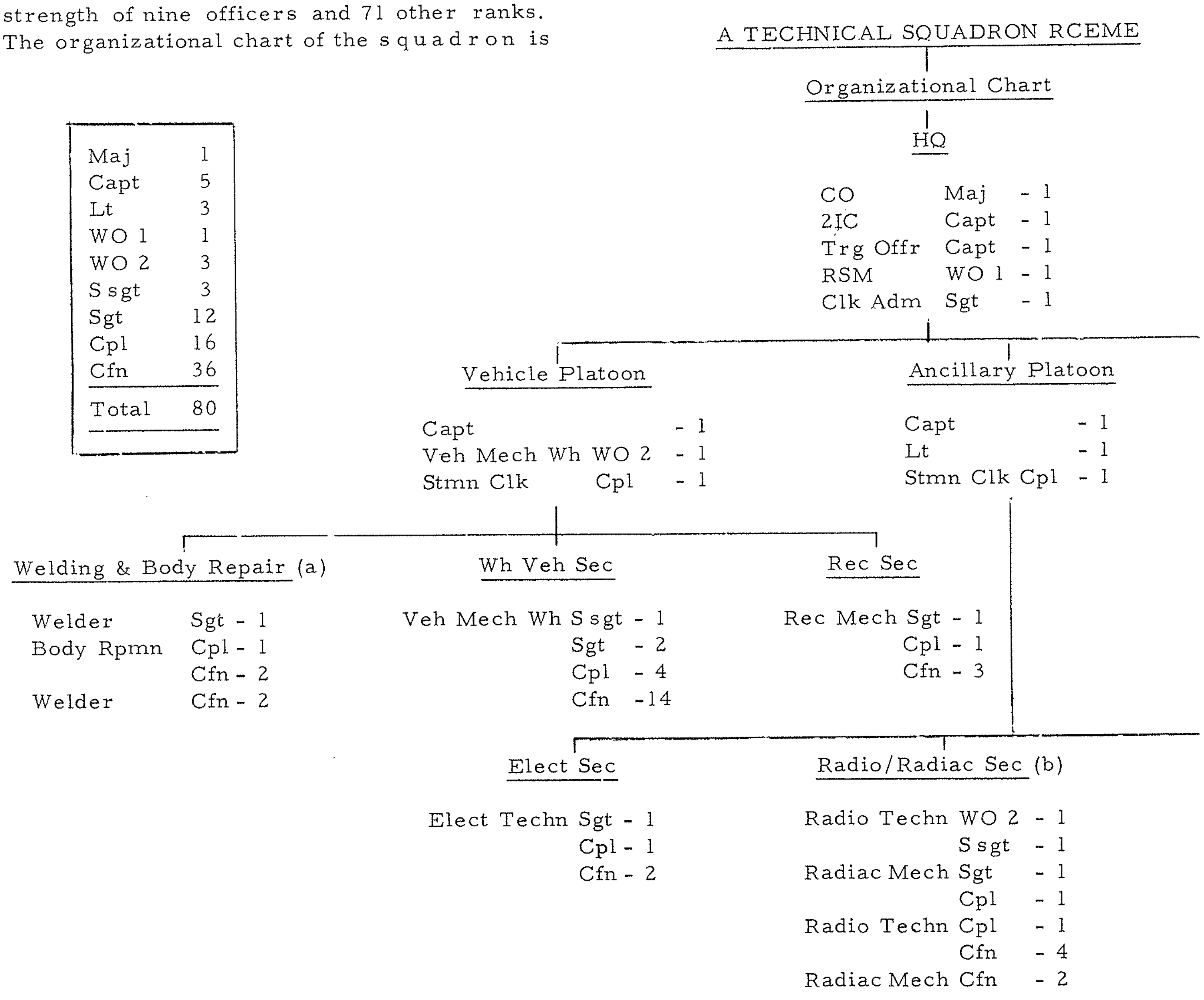
No 9 Technical Regiment (A Squadron only was activated) Calgary, Alta
No 24 Technical Squadron, Sherbrooke, Que
No 31 Technical Squadron, Blairmore, Alta
No 32 Technical Squadron, Lethbridge, Alta
No 40 Technical Squadron, Victoria, BC

As part of the reorganization, service units in major cities will be grouped together under a single headquarters to form a Service Battalion. This organization parallels the Service Battalion concept in the CA(R).

Each Technical Squadron will have a strength of nine officers and 71 other ranks. The organizational chart of the squadron is shown below. Squadrons which are not part of a Service Battalion will be provided with an administrative increment (CA(M)) consisting of a lieutenant (adm officer), a Storeman Clerk RCOC s sgt, and a Pay Clerk RCAPC cpl.

A glance at the organizational chart will show that the number of authorized CA(M) RCEME trades has almost doubled. All tradesmen positions may be covered by personnel qualified in any CA(M) or CA(R) RCEME trade. Initially it is unlikely that very much more equipment can be made available to the CA(M). Until equipment is available, squadrons will have to get by with what they now have. RCEME companies and workshops should be able to help

Maj	1
Capt	5
Lt	3
WO 1	1
WO 2	3
S sgt	3
Sgt	12
Cpl	16
Cfn	36
Total	80



A TECHNICAL SQUADRON RCEME

Organizational Chart

HQ

CO Maj - 1
2IC Capt - 1
Trg Offr Capt - 1
RSM WO 1 - 1
Clk Adm Sgt - 1

Vehicle Platoon

Capt - 1
Veh Mech Wh WO 2 - 1
Stmn Clk Cpl - 1

Ancillary Platoon

Capt - 1
Lt - 1
Stmn Clk Cpl - 1

Welding & Body Repair (a)

Welder Sgt - 1
Body Rpmn Cpl - 1
Cfn - 2
Welder Cfn - 2

Wh Veh Sec

Veh Mech Wh S sgt - 1
Sgt - 2
Cpl - 4
Cfn -14

Rec Sec

Rec Mech Sgt - 1
Cpl - 1
Cfn - 3

Elect Sec

Elect Techn Sgt - 1
Cpl - 1
Cfn - 2

Radio/Radiac Sec (b)

Radio Techn WO 2 - 1
S sgt - 1
Radiac Mech Sgt - 1
Cpl - 1
Radio Techn Cpl - 1
Cfn - 4
Radiac Mech Cfn - 2

out by supplying equipment and instructors for special training programs or exercises as they have in the past.

(Although their numbers will be reduced, RCEME members of the Militia will still have an important place in the streamlined force. We wish them the best of luck in the years to come. -Editor)

UNDER NEW MANAGEMENT

Major Hugh J McMahon, CD, formerly of The Windsor Regiment and a staff officer with 26 Militia Group headquarters, will assume command of 39 Technical Squadron, RCEME today. He succeeds Major Owen J Atkins who has commanded the unit since April 1963. The scope of 39 Technical Squadron is being expanded under the militia reorganization program and will have an increasing demand for technical talents, which will require higher skills. The Windsor REME unit is the only military unit of this type now in the Western Ontario Area and it now comes within the organizational structure of the newly formed London Service Battalion commanded by Lt-Col FE Wilson of London.

-Windsor Star (11-2-65)

Regimental Training Platoon

Capt		- 1
AI	WO 2	- 1
Clk Adm	Sgt	- 1
Stmn Clk	Cpl	- 1

Offr Trg Sec	NCO Trg Sec	Men Trg Sec
Lt - 1	Lt - 1	AI Sgt - 1
	Sgt - 1	AI Cpl - 1

Inst Sec

Inst Techn	Sgt	- 1
	Cpl	- 1
	Cfn	- 2

Wpns & Machine Sec (c)

Wpns Techn	S sgt	- 1
Mach Fitter	Sgt	- 1
	Cpl	- 1
Wpns Techn	Cpl	- 1
	Cfn	- 3
Mach Fitter	Cfn	- 2

RECEIVES FIFTH AWARD

Mr William Edward Minshull Allender, an employee of the Fuel and Electric Section of the Workshop Branch, 27 Central Ordnance Depot, on 4 Jan 65, received his fifth Suggestion Award. Mr Allender submitted suggestions for special tools for the disassembly and assembly of Ferret Scout Car generators. Other awards were given in recognition of suggestions regarding special tools used in the repair of vehicle air compressors.

Mr Allender, a nineteen-year employee, attended the London Technical School.

In Oct 1939, he joined the RCAF and was trained as an aero-engine mechanic, and was a member of the first training class at the Technical Training School, RCAF, St Thomas, Ontario. In 1942, Mr Allender was transferred to the Aeronautical Inspection Directorate and appointed Flight-Sergeant in charge of inspection in the Engine Repair Shop at No 6 Repair Depot, RCAF, Trenton, Ontario.

He received his discharge in Sep 1945, and after a short holiday he joined the staff of the Central Mechanization Depot (CMD), subsequently known as 17 Coy RCEME, 204 Base Workshop RCEME, and now Workshop Branch of 27 COD.

In the next month or so, Mr Allender plans to submit Suggestions No 6 and 7.

Mr Allender shown receiving cheques for Suggestions No 4 and 5 from Lt Col RHC Hodgson, CD, Chief Workshop Officer, Workshop Branch, 27 COD.

Looking on, l to r, are: WE Morris, Lt Col GT Kirk, MBE, CD, WC Smith and RJ Little.

EQUIPMENT FAILURE

By HA Perrault

There is a universal trait of human nature which fits the old saying "misery loves company". We like to unburden ourselves of our troubles by bending a buddy's ear perhaps during a relaxed moment over a cup of coffee or some other more nourishing beverage. Sometimes our listener is appreciative, sometimes he is even sympathetic but, more often than not, he just couldn't care less.

A popular subject around military establishments in the "tale of woe" department concerns equipment failure. Heard are such conversation as, " I just got the damn truck loaded when the fan belt snapped", or " I spent a full hour aligning the receiver when one of the electrolytics let go". There is no lack of topics. The gist of some of these conversations finds its way back to the equipment engineering group in Ottawa. The engineer, whose equipment is being defamed, shakes his head in disbelief. "What? Failures on the ABC Radio? Nonsense! I haven't had a single report of failure in over six months".

Therein lies the core of our story. No failure reports. Nothing but unconfirmable rumours.

Let's look at some basic facts. Military equipment which has been designed, developed or procured under the guidance of equipment engineers is the best that the money available can buy for the job that has to be done. Frills are usually avoided but compromise is rarely even considered where function and durability are concerned. Engineering tests in the lab or during initial trials are severe and are intended to ensure that only reliable equipment finds its way into the user's hands. This should be enough but, unfortunately, experience proves otherwise. In spite of comprehensive test programs, military equipment (and domestic equipment for that matter) has a habit of going US for innumerable reasons after it appears in service. If an excuse is needed, "state of the art" could be the whipping boy.

The author, who was with AEEE when he wrote this article, is now with Air Materiel Command RCAF, Chief of Quality Control.

When a new television set cuts out in the middle of a Stanley Cup game, the irate owner, after kicking the dumb brute a few good ones, will undoubtedly inform all and sundry of his terrible misfortune. He won't stop there however; at the first opportunity he will hurl his wrath at the merchant who sold him the garbage and demand retribution.

This may be a poor way to draw an analogy, because soldiers don't kick their equipment but also they don't get their beef back to the people who can do something about it – the equipment engineers.

Unlike the merchant, who may resent any aspersions cast on his merchandise, the military engineer is ready and eager to learn about field difficulties with the equipment for which he is responsible. There may have been holes in his test program, or perhaps some unknown influence was not considered. Maybe the material quality was not adequately controlled during manufacture, or there may have been a miscalculation. Whatever the reason, he won't know where to start looking or even that a look is required unless the information gets back to him.

Within each of the three military services there exists some form of failure reporting system. Most serve multiple functions by supplying not only failure data but also information useful to logistics and other support agencies.

For the army, the Equipment Failure Report, form CAFC 2072, is the paper involved and EME Manual Management H 601 instructs in its use. This form was designed to handle all grades of failure including major and minor, (as suggested in H 601) but has been used, for the most part, in reporting major failures only. One reason for this is, perhaps, that the preparation and handling of the reports is somewhat involved. Doubt may exist as to how much information should be included or how much may be left out. It probably boils down to the fact that most soldiers in the field don't like paper work. Those who do will probably wind up in headquarters where paper work is the name of the game.

If failures (all failures, that is) are not promptly reported, information vital to the future development of military equipment is lost and it is information which labs can't completely produce and that money can't easily buy. Make no mistake on this score! Car manufacturers, for example, spend enormous amounts of money poring over the new car failure reports from field representatives to patch design holes in subsequent production. They work on a relative dribble of information whereas, if every car owner reported his troubles direct they would have a veritable flood; and they would love it.

So it is with military equipment engineers. The more information they get, the more effort they will be able to apply in the right direction. As most of us know, it is not easy to spend government money without ample evidence of need. A rumour is not evidence; a fistfull of failure reports is.

It is one thing to recognize a need for something, but it is another matter to know how to fill it.

A comprehensive study was made recently of the present army failure reporting system and the systems in use in the other services. Each of the existing systems required a relatively involved procedure to fill out and process. The time required from initial report to corrective action was, in all cases, too long. Besides this, (except for the air force system) the number of failures being reported was hardly worthy of recognition by busy engineers. For the army, the relatively minute flow of reports indicated either that the equipment in the field was completely perfect or that reports were just not being made. There is no doubt that the latter was the case. Was there something lacking in the type of report? Did field personnel lose interest when no corrective action followed their complaints? Was there a need for a better system? To all questions the answer was obviously "yes".

In a search for a better system, a close look was taken at the program installed and operated from DEME for collecting failure information on the C42 communications equipment. A postcard with pre-printed address and with a simple format for indicating the failure, was introduced on a short term basis. The response was excellent. In just over a year, over 2000 reports were received. Many reports were incomplete, some were undecipherable, some contained complete nonsense but nothing was discarded without a thorough look. Technicians probably felt that the reporting of a single tube failure, or a blown fuse, or a loose dial knob was silly; but when one considers that reports were coming in from everywhere in the world where C42 equipment was used the situation proved anything but silly. One failure probably won't spark an expensive investigation, but the technician never knows that he isn't reporting an incident which may be occurring in a dozen different places and which indicates a definite need for corrective action.

A system similar to the C42 effort seems to be the best answer to a knotty problem. Working on this assumption, a new postcard-type report will soon be introduced. At first, it will apply only to a few specific equipments which are just being introduced into service. It will be available for use by all personnel who either use or maintain the equipment in order that reports may be completed and forwarded to the responsible equipment engineers with the least possible delay. The information received will be handled by electronic data processing and summaries will be prepared to keep field personnel informed of particular trouble areas and of just what is being done about them. A high quality will be required in reports and criticism will probably be levelled from time to time to gain that quality. Success of the program will be reflected in improved equipment but this result will depend entirely on the cooperation of everyone involved.

We of the engineering establishment know that programs of this nature have been tried before and have failed rather miserably. We are ready, nevertheless, to try again with the improved system, and trust that the chaps in the field will do their part to make this one an unqualified success.

EDITOR'S NOTE

See EME Manual General H 100.

All readers are cautioned that the new reporting system mentioned above does not relieve them of the responsibility to forward EFR. Until the new system has been proven these must continue. The weakness of the present system outlined in this article and the arguments used in support of a new system all serve to illustrate the need for prompt and imaginative reporting. As the repair authority, DEME must in many cases direct repair action even before a design change can be considered.

Reports concerning failures of reported equipment or assemblies are an important part of quality control.

The operators and technicians who operate, maintain or repair equipments at units, corps schools and area, field and base workshops should submit report cards on the following occasions:

Operators – to report recurring malfunctions of a minor nature which can be corrected by adjustment or minor parts replacement.

– to report unsatisfactory performance (see cut below!) or other significant events observed in connection with failures requiring repair.

– to report cases where operation, handling or maintenance is made difficult by the equipment layout or installation.

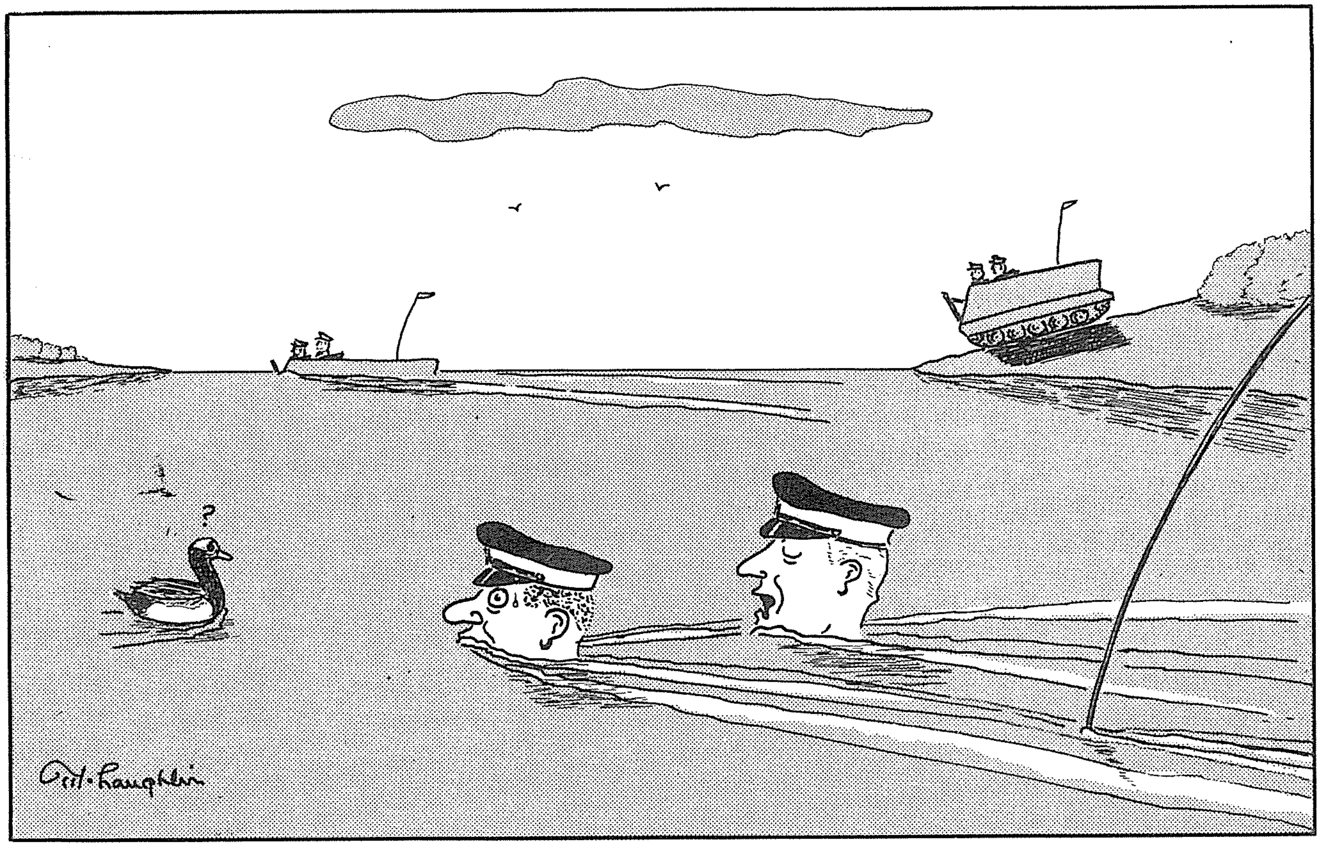
Technicians – to furnish technical details of all faults requiring repair, replacement or adjustment.

– to report abnormal wear or other conditions that might lead to premature failure.

– to report on difficulties encountered in the repair or maintenance of the equipment due to inadequacies in the design, layout or installation.

It is essential that cards be completed in as much detail as possible but where an item, such as operating time or actual part causing the fault, is not known, that portion of the card may be left blank.

The success of this reporting system depends on the operators and technicians who operate, maintain and repair these equipments and everyone concerned should read and be familiar with the procedures detailed in EME Manual General H 100.



MAC FUDD... ARE YOU QUITE SURE OUR CARRIER SHOULDN'T FLOAT HIGHER THAN THIS?

A NEW SLANT ON SUPERVISION

By Major JM Treleaven, CD

Workers, not supervisors, are responsible for production! Supervisors are to provide information, materials and the organization that the workers need to do their jobs but otherwise to stay out of the way.

Revolutionary? Not really, according to the Institute of Social Research at the University of Michigan. Employees need to be more than well paid, well insured, with security and fringe benefits; they must be well led. Good motivation and high production appear to result from a particular kind of leadership – interested, supportive, but non-instrusive.

In the long run, efficiency was not found to be compatible with the forceful kind of leadership which is devoted primarily to getting things done. The conventional production drive approach to supervision, while effective for a short period, will create an 'unreasonable' resistance to itself and in time, negate its effectiveness. It is much like trying to push a boat through the water broadside. The harder you push, the harder the water fights back.

This modified theory in effect is saying that a group which is properly led will generate enough satisfaction, pride and sense of accomplishment, to motivate itself to higher production. It also suggests that when a supervisor inserts himself too boldly into the day-to-day problems of production, as management policy often requires him to do, such 'interference' will lessen the endeavour of the group members towards higher performance.

The irony of it all is that those supervisors who are pushing the hardest and making the least headway are usually carrying out management's basic wishes more directly than are other supervisors. They are creating a 'favorable impression' and are recognized as good supervisors in spite of low production records.

According to the Michigan studies, to maintain productivity to a consistently high level the man in charge must find ways of adopting his daily supervisory tactics to support, not block, the sense of achievement and feeling of well-being of the men whose work he directs. The most productive leader is the man with enough self-discipline to allow his subordinates to perform their work in their own way (provided, of course, that it gets done) rather than compel them to operate according to his own working habits.

These observations stem from the study of several of the most productive of US companies. Controls were loose, standards were enforced in a rather general way, and uniformity of procedure by the various workers was not considered particularly important. Then what prevented chaos? The workers themselves did, largely because the supervisor had succeeded in making the group's production goals a vehicle by which they developed their own sense of achievement and well-being.

High producing supervisors set general goals and objectives and provided less specific direction. Low producing supervisors exercised control through rigid authority; they organized jobs, prescribed methods, set standards and established performance goals. Compliance with these was sought through the use of supervisory and economic pressures.

When leadership contributes to productivity it is usually because an atmosphere has been created which the employee regards as compatible with his own psychological advantage. He is likely to involve himself more whole-heartedly in his work. He is not aware of why he feels free to give so much of himself to his work. His boss is a nice enough fellow, as are his fellow workers and he enjoys his work. He cannot be more specific. He seems to be reacting to a general atmosphere created by a leadership style that symbolizes this supportive attitude. The effective leader is the architect of an atmosphere that supports whatever his subordinates regard as being in their best interests.

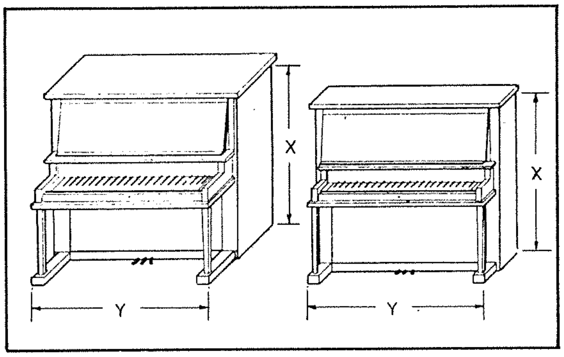
So, to be a good supervisor, one must supply the resources, the general direction and the 'atmosphere'; the work will look after itself. This recognizes the dignity of man which is one of the biggest problems in this age of large organizations and specific methods and procedures. Management must learn to judge supervisors on the basis of their results, and not solely on a display of 'supervisory talent', that smoke screen which we in the military are so adept at using.

(Motivation and Productivity – Gellerman, published by the American Management Association, is recommended as most interesting reading in this field. -JMT)

THERE'S MORE TO IT THAN MEETS THE EYE

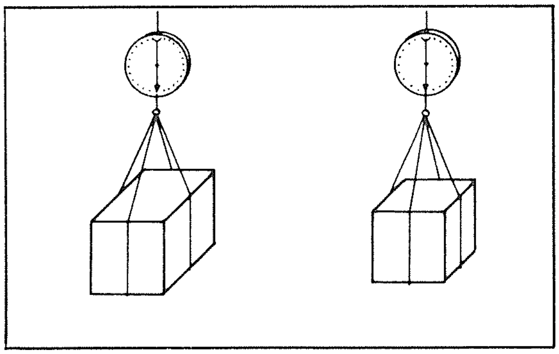
By AL Radbourne, DEME

Illusion – a "sensuous perception of an external object involving a false belief."
or
a "false interpretation of something perceived through the special senses."



In all three illustrations an illusion is apparent. However, both pianos are the same size, both railroads are identical and the scales are balanced. It's all in the way you look at it! In other words, we have used different methods of showing exactly the same thing, have applied but two of many methods of projection to the same problem, deliberately selected in order to create an illusion. The illusion is interesting but secondary and unimportant.

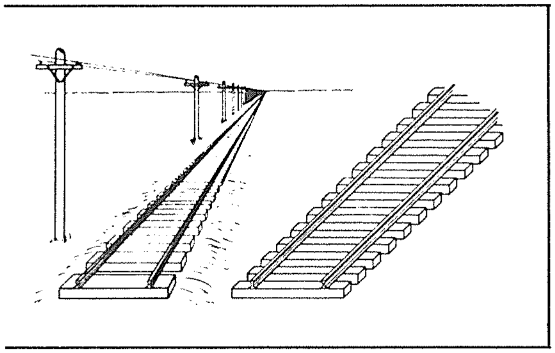
The theory of projection is a most comprehensive study and it is only by comparison of the many methods that we can appreciate the value of each and be able to select the one which best serves our purpose.



Generally speaking, there are three main categories of projection, namely, perspective, oblique and orthographic, each branching off into several distinct classifications having their own individual identity, purpose and set of rules. They provide a common form of communication, a standard that is universally accepted, applied and understood. There is no language barrier.

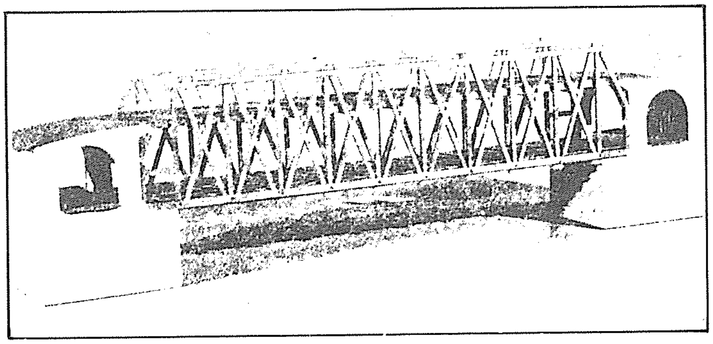
The man technically trained to apply standard procedures in the preparation of engineering drawings is but a part of the team. The drawing and the information it contains is of no use whatsoever unless the production man has the technical training to interpret it and to produce from it, particularly in this age of widespread production and assembly areas.

This form of common knowledge – standardization of drawing practice – is vital.



Without it, our engineering achievements as we know them today would be difficult to imagine.

In November 1964, the Verrazanno Narrows bridge over New York Harbour was opened, realizing an "impossible" dream of over half a century. It was designed to carry 12 million vehicles a year on a six-lane deck with provision for a second deck to boost the travel rate to 48 million vehicles a year. Its two towers rise to 690 feet and are 4260 feet apart – the world's largest suspension span. Three major steel companies were involved in the prefabrication of towers, cable and roadways. "Engineering drawings were required by the tens of thousands. Every component had to be



exactly located - in advance - down to the eight million bolts and rivets in the towers."

This is but one example of the application to modern engineering genius of standard drawing practice, and the technical knowledge and ability to produce from them.

> But is there really anything new under the sun?
> Just how 'modern' are we?

History records that "... drawing was used in ancient times to delineate the exact forms and sizes of structures." The Bible states that Solomon's Temple was "built of stone made ready before it was brought thither", indicating that drawings were used to describe the forms and sizes of the individual members of this historic structure. Likewise, ancient Greek temples so complex in arrangement and refined in detail, as the Parthenon for example, could not have been constructed without accurate drawings to guide the artisans in forming the structural elements, and the builders in assembling them.

Vitruvius, in 30 BC wrote a treatise on architecture in which he referred to projection drawings for structures, but it was not until the early part of the fifteenth century that the theory of projections was well developed by Italian architects Brunelleschi, Alberti and others.

Clay tablets exist which clearly show the crude plans and sketches of our earliest builders. The people of Mesopotamia used drawing materials as far back as 2200 BC.

Ancient Egyptians chiselled plans and sketches of their pyramids on limestone, papyrus and wood.

Evidence proves beyond question the struggle man has had over the centuries in trying to show the three dimensional qualities of a solid mass on a flat surface.

Leonardo da Vinci, in the fifteenth century, made a study of drawing and painting, established a method and gave instruction for several years - probably one of the first school of draughting. However, his theories and findings were not published until the middle of the seventeenth century. His countless drawings illustrate every kind of phenomenon in the fields of art and science. The reproduction shown here of a model of his two-level bridge is interesting by comparison to the two-level Verrazanno-Narrows bridge. We wonder whether or not the enclosures at each end are for the use of toll-takers. The 'Study for Helicopters' illustrates his thinking far in advance of the era in which he lived. (Note the shop notes and comments written from right to left in mirror image, in order to keep his ideas as private as possible).

As we said, is there really anything new?

The theory of projection drawing was advanced to an academic study by the introduction of two planes of projection at right angles to each other by the French mathematician Gaspard Monge, near the end of the eighteenth century. This development provides the basis of descriptive (for some time this system was considered a military secret) geometry, the science relating to the graphical description of objects of three dimensions and provides exercises designed to train the mind to visualize and to solve space problems.

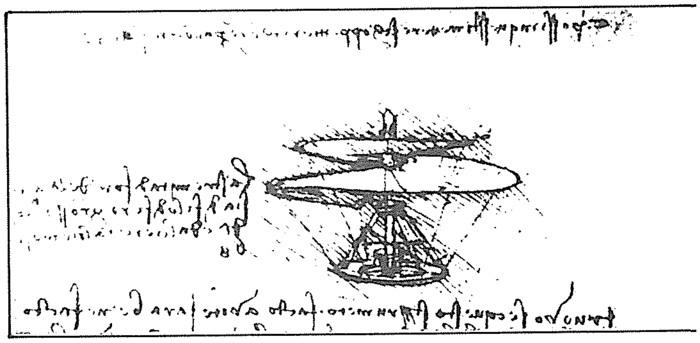
It was from Monge's principles that our present system of projection theory has been developed; and we are not finished yet.

Standardization within the electrical, electronic and mechanical fields has to keep pace with the rapid advancement of technical knowledge and achievement.

The RCEME Corps has played its part through representation on standardization panels and sub-committees and is still doing so.

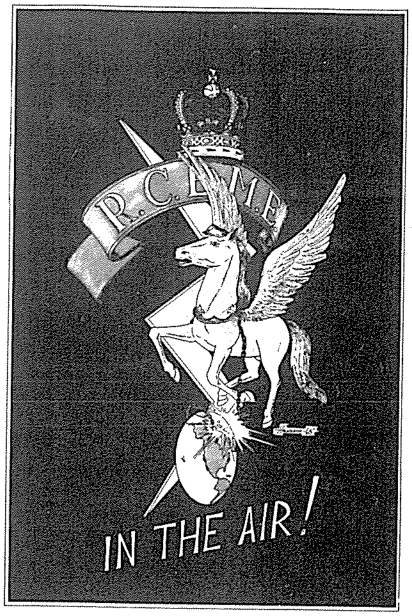
And so as the seed is planted, the tree will grow - the idea conceived, the pencil stub, and the eager, rough preliminary sketch on the back of an old telephone bill - it matters not the medium so long as there is the knowledge and ability to conceive it and (most important) to impart it, clearly, precisely.

It has been an interesting and progressive history.

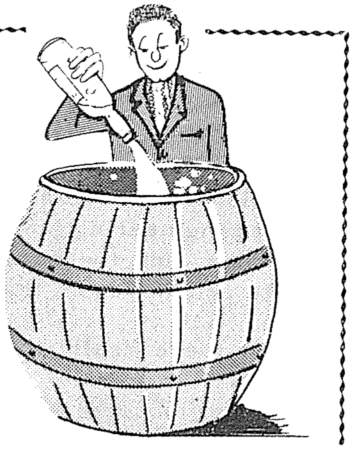


RCEME IN THE AIR

Contributed by Ssgt JE Knight RCEME
CFHQ T/L Flight


R.C.E.M.E.
IN THE AIR!

WINE OR WATER?



A triumphal celebration was planned in a little remote Spanish town and, to ensure adequate liquid refreshment, a great cask was constructed into which each citizen agreed to pour one bottle of his best wine.

"If I fill my bottle with water", thought one, "the dilution will be so slight that no one will notice."

But when the celebration started and the cask was tapped, the contents proved to be nothing but water. Everybody in the town had reasoned the same way—"My little bit won't be missed".

This, of course is only a story, but let us compare it to accident prevention. Every man is expected to contribute his little bit to prevent accidents. He usually knows HOW and he knows WHY a job should be done a certain safe way. He is fully aware of the terrible consequences that can result from accidents. Yet there would seem to be many persons who have the same idea as the inhabitants of the little Spanish town—"My little bit won't be missed". But, like the contents of the wine cask, an accident prevention programme depends entirely on the contribution of everyone concerned.

If we change the word "cask" to "task" each one, then, who fails to contribute his little bit to the task of accident prevention detracts that much from its effectiveness. Unfortunately, there are still some people in all ranks "filling their bottles with water", giving lip service to accident prevention and Flight Safety.

Accidents thrive on complacency, incompetence, lack of active interest, lack of team spirit and general negligence. Find a unit where everyone is sincerely interested and truly concerned about Flight Safety, and without doubt you will have found a unit with a fine safety record.

(*Adapted from "IAPA Bulletin"*).

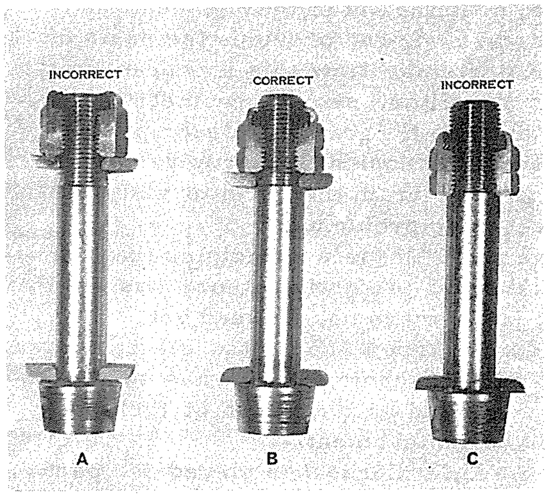


Figure 1 - Correct Washer Installation is Critical to the Bolt Preload

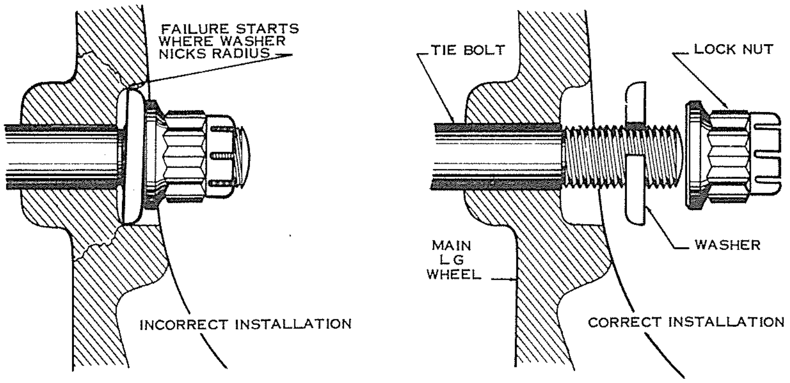


Figure 2 - Carelessly Installed Saddle Washers Lead to Fatigue Cracks

TIE BOLTS TAKE CARE

In Fig 1a, a washer has been carelessly reversed, preventing the bolt from extending through the nut sufficiently to ensure locking. When properly installed, round or chamfered bolts should extend at least the full round or chamfer through the nut, preferably one or two threads (Fig 1b). This will ensure the full locking capability of the nut. Fig 1c shows that a washer has been carelessly omitted and the nut has bottomed out, preventing proper pre-loading of the bolt. The position of the nut with respect to the end of the bolt in cases a and c is a clue that something is amiss and an inspection of the installation is in order.

Saddle washers carelessly installed so that sharp edges nick the radius of the spot face, as in Fig 2, will cause fatigue cracks. These cracks are hidden by the washers until serious damage is evident.

Flat washers, countersunk to accept the bolt head-to-shank fillet, are often carelessly installed in reverse order, as shown in Fig 3. Fatigue cracks originate in the nicked radius of the bolt, and the bolt will fail as indicated.

The human factor, then, cannot be ignored or over-emphasized in any tie bolt installation. No method has yet been devised to "people-proof" precision fasteners. Here are some of the common installation errors that result from carelessness or indifference:

Mis-setting a torque adjustment.
Mis-reading the torque indicator.
Installing the wrong bolt and/or nut.
Adding an extra washer or leaving one out.
Improperly installing washers.
Failing to lubricate properly.
Lubricating when dry torque is specified, or torquing dry when Lubtork is specified.
Careless handling of tie bolts (battered threads affect wrench torque and bolt preload).

The need for greater interest in wheel fasteners should be re-emphasized. There is no greater deterrent to indifference than a knowledge of the problems that indifference can generate. No one cares to be part of an accident, or to be responsible for one. Treat wheel fasteners with care and respect, comply with the appropriate technical orders, and safety and reliability will not be compromised.

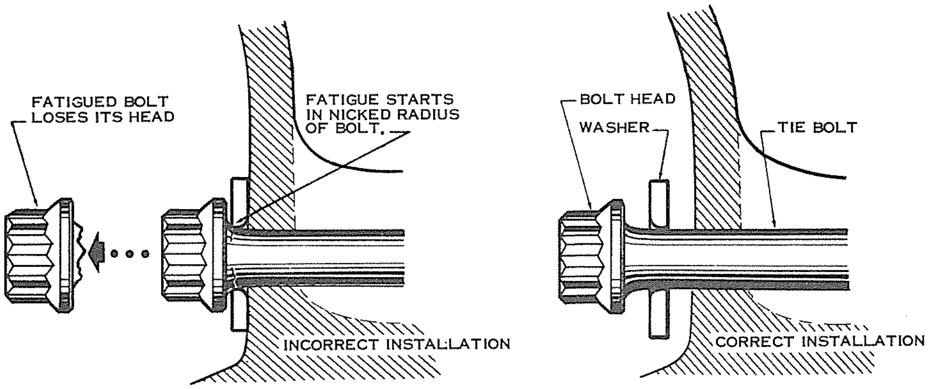

FATIGUED BOLT LOSES ITS HEAD
FATIGUE STARTS IN NICKED RADIUS OF BOLT.
INCORRECT INSTALLATION
BOLT HEAD
WASHER
TIE BOLT
CORRECT INSTALLATION

Figure 3 - Reversed Countersink Washers Cause Failure at Radius of Bolt

RETIRING OFFICERS HONOURED

Retiring officers of the Corps were dined out at a mess dinner in the RCEME School on March 12, 1965. Above, shown with Col A Mendelsohn, DEME and Col KR Ward, Head of Corps and Commandant of the School, are the retiring officers who were able to attend: (l to r) Lt HA Patterson, CD, Capt JE Peacock, CD, Capt WG Collins, CD, Capt GM Hagan, Maj KLF Coupland, CD, Capt EJ Stow, CD, Maj HHE Erb, CD, Lt Col CMR Elmsley, CD, Maj EW Cole, CD, Maj DD Campbell, CD, Maj JL Sloan, CD, Capt HK Warren, CD, Lt EM Conway, CD.

(Photo by Capt WA Thomas)

Other officers honoured in their absence were:

Lt Col WH Dalrymple, MBE, CD
Maj JS Kitto, MBE, CD
Maj RL MacDonald, CD
Maj GP Miggins, CD

Capt TR Palfrey, CD
Capt JR Peters, CD
Capt GE Ball, CD
Capt JS McIntyre, CD

Capt BH Wright, CD
Lt GF Bews, CD
Lt J Tatham, CD

MORE EXCERPTS FROM "SPANNER"

On January 20, Aircraft and Forward Repair Platoons arose early in the morning to spend a cold windy (invigorating) day on the rifle range at Haltern. In spite of the conditions the scores were amazingly good. Cpl Smith of Aircraft was the "big shot" with a score of 67 out of a possible 83.

The first M113A1 course for RCEME Electricians started on Monday. A total of six students were enrolled: Cpl Jackson from 1 RCR, Cpl High 2 RHC, Cpl Thorburn 1 PPCLI and Ssgt Atkins, Cfn Sibley and Clarke from the workshop.

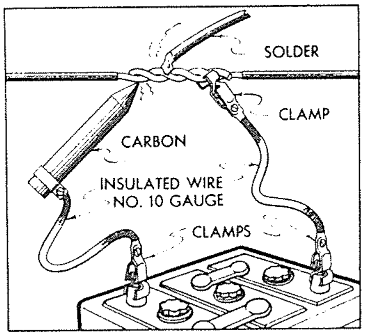
Four candidates from the workshop were chosen to attend a junior NCO course at the Battle School beginning 4 Jan.

The hard working four are Pte K Eackin and JR Toogood and Cfn DB Whalen and JAC Lacroix.

QUICK SOLDERING

Having to spend half an hour to solder one teensie-weensie little connection is downright exasperating. The actual soldering only takes about a minute. Getting the iron ready is what takes the time. Chances are you'll have to fill the blowtorch, then dress up the soldering iron before you even get started. In other words, it's no wonder temptation often wins and you leave the new terminal or spliced wire unsoldered – knowing full well that somebody is going to develop a severe headache trying to locate the trouble when looseness and corrosion sets in.

You don't have to make such a fuss over each little soldering job. If you want you can solder without an iron or a torch. All you do is saw a standard size flashlight battery in half and take out the carbon rod. A six-volt battery, two pieces of fairly heavy insulated wire, three battery clips and the carbon rod is all you need. Grind one end of the carbon rod to a dull point, attach one of the wires to the opposite end with a clamp, and you'll be ready to do a soldering job anytime in jig time. Just make the connections like the picture shows.



The battery in the vehicle can be used if you haven't another one at your elbow. If you use the vehicle battery, however, disconnect the battery cables so you won't cause damage to the vehicle wiring by a short circuit.

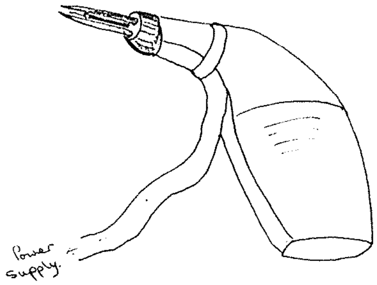
When you touch the part to be soldered with the carbon rod, the parts will be heated sufficiently to melt the solder. You'll still have to observe the simple rules of cleaning and using a rosin core solder, but think of the time you can save if you don't have to worry your curly cranium about getting an iron hot!

A sophisticated refinement of this primitive but effective soldering method is the Heatless Soldering Tool developed by Westinghouse Aerospace Division, Westinghouse Electric Corporation, Baltimore, Md. A line sketch of the tool, which is still considered to be under development although it has been tested on production lines, is shown below.

The "sharp end" of the tool consists of two sharp tungsten tips which are able to cut through oxides, flux, or other deposits, and make good electrical contact with the material to be soldered. Tungsten is a good conductor, is not affected by the heat generated in the work nor by contact with solder and flux. The voltage across the tips can be selected from a wide range of voltages, under two volts, and separate battery and AC-line power supplies have been designed for use with the same tool.

An interesting feature is the automatic solder feed from the handgrip, through a tube between the tips which makes possible one-handed operation.

The advantages of the tool are said to be that; cold solder joints are virtually eliminated; heat damage to components, insulation, and fingers, is eliminated, since the tips do not get hot; need for maintenance is reduced since there is no tip wear or corrosion, and tips do not need tinning ; the use of long, narrow tips gives access to confined spaces; and, two volts is not very "shocking".



WO1 WILKINSON RETIRES

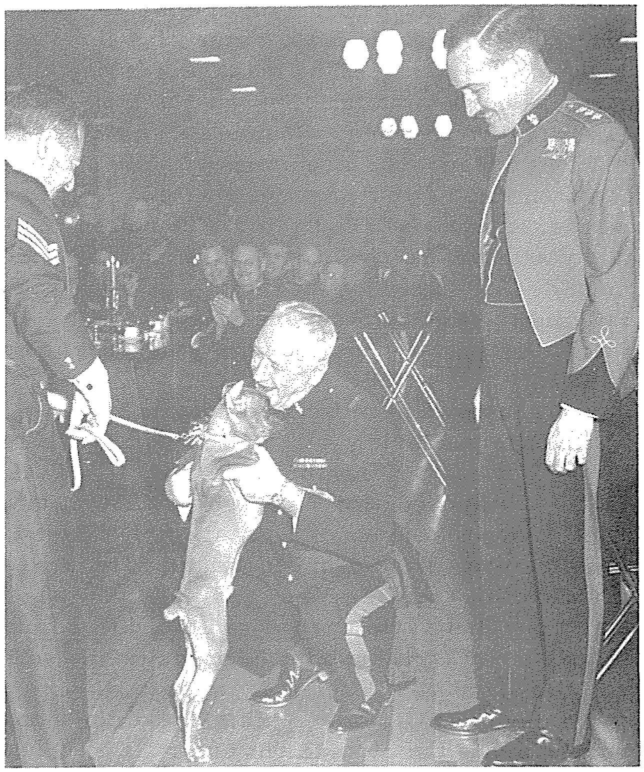
WO1 (ETSM) EJ Wilkinson retired from the CA (R) in January 1965 and was succeeded as Sr Wksp Superintendent by WO1 E Doherty.

WO1 Wilkinson enlisted in the RCA as a gunner in September 1939, served in Canada, the UK and Northwest Europe during The Second World War, transferred to RCEME in 1946 and has served with various artillery and RCEME units throughout Canada during that time.

The best wishes of his many friends followed Mr Wilkinson as he went to the PD for release proceedings and thence to retirement leave.

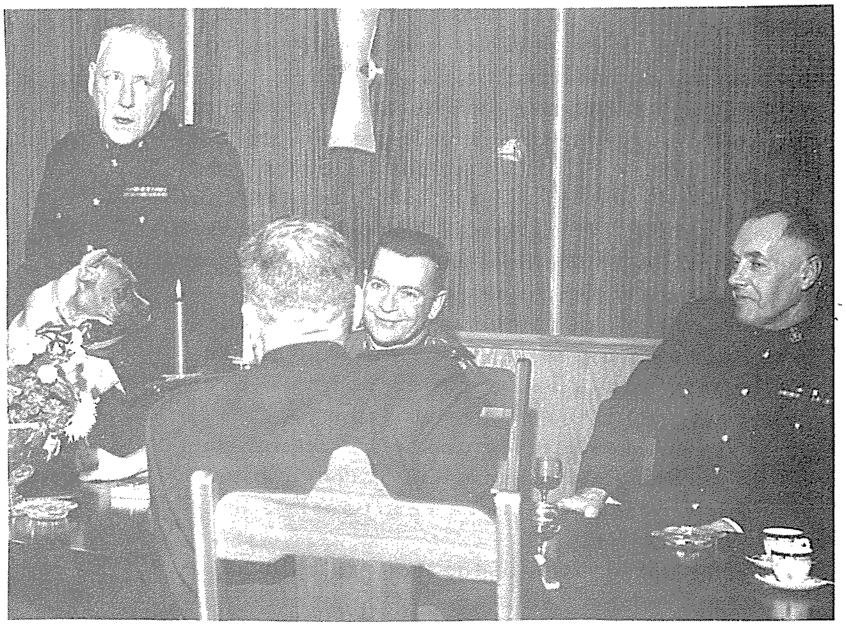
A Mess Dinner was held in Mr Wilkinson's honour in November 1964 and was attended by the Commanding Officer, Col GW Thompson; the OC Adm and Trg Dept, Major HA Popkin; the WOs, Sr NCOs, associate mess members and a small number of invited guests.

Mr Wilkinson was presented with a Boxer pup (officially christened "RCEME Longue Point") by his associates at 202 Base Workshop.



Getting Acquainted

Col Thompson formally bids WO1 Wilkinson farewell and bon voyage.



Mr Wilkinson says his official farewell while the pup eyes the major. (l to r besides 'Wilky' and RCEME Longue Point) WO1 Doherty (back to camera) Major Popkin and WO1 WA Taylor, RSM RCOC School.

RCEME OFFICERS' CURLING BONSPIEL 1964-65

202 Base Workshop RCEME was host to the annual RCEME Officers' Curling Bonspiel on 14 Nov 64.

Eight rinks, divided into two divisions participated as follows:

Division 1	Division 2
202 Base Wksp, No 1	202 Base Wksp, No 2
Capt JF O'Connor Lt LM Harvey Lt RL Walker Capt WGL Russell	Major J Adams Lt EB MacLellan Col GW Thompson Lt P Rouillard
202 Base Wksp, No 3	Ottawa, No 1
Capt JR Griffin Major AJ Jeffery Lt HG Kayne Major JH Bourne	Major R McKay-Keenan Major FW Chapman Major R Peters Capt FJ Burton
Ottawa, No 2	HQ RCEME Quebec Command
Capt RH Purton Capt GW Swallow Capt JR O'Neill Lt-Col DJ Tidy	Lt-Col HM Robinson Major CG Racicot Major RC Rivers Capt J Ormond (rtd)
HQ RCEME Eastern Quebec Area	RCEME, No 8
Major RH MacLeod Lt JP Durocher Major CR Morgan Major RL MacIntosh	Capt WJA Groom Major JE Cuddihey Capt JJ Kane Major EW Cole (rtd) (without sweeping)

The Final Matches were played at 1900 hrs with Major McKay-Keenan (Ottawa 1) defeating Capt Purton (Ottawa 2) 11-8 to win the COLE BOWL. Major MacLeod (HQ RCEME Eastern Quebec Area) defeated Major Adams (202 Base Wksp, No 2) for 3rd place. Capt Griffin (202 Base Wksp, No 3) defeated Capt Groom (RCEME, No 8) for 5th place. Capt O'Connor (202 Base Wksp, No 1) defeated Lt-Col Robinson (HQ RCEME Quebec Command) for 7th place.

The Bonspiel started with an Oyster Party at the RCOC Officers' Mess on Friday evening, 13 Nov 64, with the Director, Colonel A Mendelsohn, the guest of honour. After the presentation of the COLE BOWL to Major McKay-Keenan and his rink by Major Cole, a social evening was held at the RCOC Officers' Mess concluding a very enjoyable and entertaining weekend.

Remarks by Major Cole at the First Presentation of the 'Cole Bowl'.

"It affords me great pleasure to present this cup, to be awarded each year to the winner of the RCEME Officers' Annual Bonspiel. The COLE BOWL, as it has already been dubbed, has had a varied and lengthy history – the exact details have long since been lost in antiquity. It came into my possession from a member of the 'backbone of our Corps' – a s sgt artificer – who, while removing the dents and scratches from the fine silver, also removed the inscription, hence the veil surrounding its origin.

"A word or two might be appropriate on the initial planning of this worthwhile annual event. In Dec 1962, Colonel CW Jones, then

CO 202 Base Workshop, first conceived the idea of a RCEME officers' curlfest. A team or teams from Montreal and Ottawa were to travel to Petawawa, Camp Borden, London, Oakville, RCEME School, and thence home. However, after an evening at home with protractor and map in hand, in which he estimated that some 1000 miles were involved in a space of six days to say nothing of the five bonspiels, he came up with the present plan. The first gathering of the Clan was at the RCEME School in Mar 63. Lt-Col Coleman's rink from DEME were the winners.

"In presenting the COLE BOWL to Reg McKay-Keenan, skip of the winning team for 1964, it is my earnest hope that the event will continue in popularity for many years, in which happy circumstance I would welcome an invitation to leave my comfortable retirement armchair and wish all my old comrades Good Luck and Happy Curling."

Ev Cole and the Cole Bowl

Mr Allen, left, and Wally Brum, welding instructors, preparing to teach use of welding gun.

ALUMINUM WELDING

By Sgt KL Moore

The introduction of aluminum alloys into the construction of army equipment has become an important factor to the welding trade.

Aluminum and its alloys like other metals have certain distinctive characteristics which affect its ability to be welded. One of these characteristics is the oxide film which forms on all exposed surfaces. This film does not melt at welding temperatures. Its formation is accelerated by heat and certain alloying constituents, such as magnesium, and must be removed by chemical means such as a flux, or deoxidizing arc to ensure a sound weld. With this knowledge a skilled welder can readily produce good welds by any of the usual welding processes.

There are four general methods of welding used in the repair and fabrication of aluminum alloys. They are:

a. Gas welding,
b. Metal arc welding,
c. Tungsten inert gas arc welding, and
d. Metallic inert gas arc welding.

Each process has certain advantages and disadvantages.

Gas Welding

The equipment required for gas welding of aluminum is inexpensive; the technique is easy to acquire, and good quality welds can be made on most commercial aluminum alloys up to 1/4 inch thickness. The disadvantages are that preheat is necessary, which leaves tempered aluminum in an annealed condition. A very active flux is required, which must be completely removed, to prevent future damage by corrosion.

Metal Arc Welding

Standard metal arc welding is not a satisfactory method of welding aluminum. A coated metallic electrode is used and the technique is much the same as that used for steel except that the process is two or three times as fast. The resulting welds are very porous and as in gas welding, flux removal is a problem. This method should not be used on aluminum armour plate.

Tungsten Inert Gas (TIG) Arc Welding

In this process an arc is struck between a tungsten electrode and the piece to be welded; the molten metal is surrounded by a shield of inert argon gas which prevents oxidation. Welding rod is added from a welding rod held in the other hand. The equipment is more expensive than that of gas or metal arc welding, but this is more than offset by not having to remove flux; better quality welds are produced; and the welder has better control of the molten weld metal. The TIG process is the best tool for maintenance welding of aluminum up to 1/2 inch thickness, particularly castings.

Metallic Inert Gas (MIG) Arc Welding

In the MIG process an arc is struck between a consumable metal electrode and the piece to be welded, under a shield of argon gas. It is a semi-automatic process in that wire feed is controlled within the apparatus. The welder has only to watch that he moves the welding gun forward at a speed that will provide a sound weld. Very high amperages are used. On 1/8 inch aluminum plate, welding speed may be as high as 40 inches per minute. Because of its high speed, stronger welds are made on aluminum at lower cost than by any other process.

Until recently all repair welding in workshops was accomplished by gas or metal arc welding. The purchase of the M113A1 with aluminum armour requires the use of the metallic inert gas arc welding equipment. Military welders are being trained at the RCEME School in the new techniques necessary for efficient use of MIG equipment, soon to be introduced into many RCEME workshops.

LETTERS

Sir:

We have only one brigadier ex RCEME – can't you keep track of him? (Who's Where Jan 65) KH McKibbin left West Ont Area in June 64 to go to Indo-China.

Old Friend

[Right you are. In the process of integration of Personnel Services, our usually reliable source has become unreliable. Brig McKibbin is the Military Adviser, Military Component, Canadian Delegation, Laos.]

-Editor

Sir:

After having read "The Case For The Craftsman" by S sgt Peter Johnson in the October 64 issue, I can only say, "Well done Staff". His insight into the problem and clarity of thinking reflect the high standard of personal intelligence so desirable in RCEME personnel. As long as the Corps continues to have such men as S sgt Johnson on its rolls, it is bound to keep apace with modern concepts and keep the Army on the move.

Reference the single-phase to three-phase transformer cover on page 23 of the same issue, I can only make one comment – Are you kidding?

In conclusion, I would like to congratulate the staff of the Technical Bulletin on a fine job. Keep up the good work.

DB Perrin, Capt

Sir:

After the first quick reading of the article, "Equipment Courses – are they necessary at School level," one is convinced that such courses are essential; that this is the only efficient way to train technicians on a new equipment.

After the second careful reading, however, one becomes aware that some of the basic premises of the article are, to say the least, debatable. Let's take it section by section.

Effective Instructors

There is a persistent rumour in the Corps, that if your documents contain the comment, "Never to be employed as a RCEME School instructor", that is just what you'll be, sooner or later.

True or false, there is no doubt that RCEME School instructors vary in effectiveness. Some are very good; some are very poor; but the vast majority at any time are conscientious NCOs trying to do their best. It is a pity that their best falls short of their potential, due to the lack of any system of training in the School which would better prepare them for classroom teaching in the trades companies.

At the unit level should a RCEME supervisor be required to instruct? Should he be required to refresh and improve his knowledge of certain subjects far beyond a passing standard at the expense of his supervisory duties? He'd better refresh and improve his knowledge somehow, or it won't be long before he knows less about the theory of his trade than a craftsman fresh out of the School!

As far as the first question is concerned: a RCEME supervisor is an NCO; an NCO is a leader; a leader is a teacher!

A supervisor teaches a great deal just by example. If he is interested in new equipment, he passes this interest on to his subordinates, for in any unit an NCO's behaviour and attitude are copied by his subordinates to a far greater extent than he or they realize. What teacher wouldn't give his right arm for this kind of influence over his students? But it takes time to develop, and on an equipment course the students hardly have time to learn the instructor's name, never mind decide whether he's worth copying.

Equipment, Training Aids and Reference Material

The best reference text for any equipment course is the applicable EME Manual Instruction. Since EME Manuals are on distribution to even the smallest RCEME unit, would any more volumes of reference material be required for unit training?

Of course, EME Manuals are often not available for a new equipment. After all, they're not even available for all the old equipment. But this is a situation that could probably be remedied – to the benefit of all concerned.

"The best training aid is the equipment itself". Large, simplified training aids merely enable large classes to be taught with a minimum of equipment and one instructor. But the best training aid is still the equipment itself, and the best student/teacher ratio is still 1:1. This is impossible in the School - but is it impossible in the unit?

It is said that, "... if unit level maintenance training is carried out when bulk shipments arrive... there would be a considerable delay in maintenance support"; presumably while the technicians get some practical experience taking the thing to pieces.

How much practical experience would a technician miss by not going to the School? Let's take a six week course.

10 per cent (3 days) of his time is taken up with administration: clearing in and out, parades, sports days, clean-up, etc.

50 per cent of his time, perhaps, is spent in the classroom learning theory.

This leaves 40 per cent for practical. But - there are usually 10 men on a course, and even if two men work together, they can spend only 8 per cent of their time actually working on the equipment. On the basis of a 40-hour week, this amounts to 19.2 hours, or 2 1/2 working days. On a new equipment you may have to wait 2 1/2 weeks for parts the first time it breaks down, and a course won't shorten this delay.

Qualifications

There can be little argument about the uniform quality of instruction and the steadily improving standard of School courses. But of what value are the paper qualifications earned on these courses? A year after the course is over, if there has been no opportunity to work on the equipment, they are probably not worth the paper they are written on. This is especially true if 'production' is considered more important than keeping up a good general knowledge of the trade.

Time

"If equipment courses are run at unit level, how do we meet production deadlines?"

The only RCEME units with a year-round concern for "production deadlines" are Static Workshops. It is interesting to note, therefore, that only 30 per cent of the total RCEME establishment of ORs is employed in Static Workshops. For the other 70 per cent, demands on their time are more or less flexible.

In any case, does RCEME exist solely to meet the repair requirements of a peacetime army, or is there a training responsibility? If the first, then the Glassco Commission Report implies that it would be more efficient to disband the Corps altogether and have the work done by civilian contract. If the second, then allowance should be made for training time when setting unit establishments.

Travel

A trip to the School certainly provides an opportunity to meet old friends, and "tie a few on" away from the wife's watchful eye, but it has few advantages to the army. The man who is interested and enthusiastic about his trade will probably learn just as fast and just as easily at home as he will at the school: the man who isn't interested and enthusiastic isn't likely to learn much in either place.

Summary

The main points of this counter-argument are:

1. Classroom teaching is an art. The hit-or-miss methods used to select and train RCEME School instructors do not produce many artists.

2. Specific reference material is available as readily at the unit as it is at the School, or should be.

3. Given an adequate background of basic trades knowledge, training aids are unnecessary when the equipment itself is available; and the initial maintenance delays are more likely to be due to lack of spares than to practically inexperienced tradesmen.

4. Training is a continuing and essential duty in all RCEME units. Far from a tradesman forgetting his everyday job in order to learn, learning should be a part of his everyday job.

5. In-job training is part of a good supervisor's job, and RCEME has lots of good supervisors!

These points indicate that equipment courses, for experienced tradesmen, are not necessary, that is to say, essential. It will be a sad day for the Corps when, by saying such courses are necessary, it is implied that tradesmen should not even attempt to repair an equipment if they don't have a piece of paper saying they've qualified on it on a RCEME School course.

Ssgt J

"THOSE PEOPLE IN OTTAWA"

By S sgt P Johnson

Working in DEME is both interesting and frustrating.

The frustrating part is that you seldom, if ever, see the final results of your work. It is like working on an assembly line without knowing what the final product is going to be, or whether the customer is ever satisfied with it. In a shop you can test what you have done, to see whether the equipment works before you send it out. In the School you can test the students before they leave, to find out what they have learned. Here there are no tests you can apply, no absolute standards by which you can measure the quality of your work. You must rely on someone else's word, on time, on your self-confidence for a feeling of job satisfaction.

The interesting part of working in DEME, for me anyway, is having the opportunity to learn what DEME is, what DEME does, and who "those people in Ottawa" are as far as RCEME is concerned.

DEME is about 100 people: 40 officers, 40 ORs, and 20 civilians. They are divided into the different sections shown on the organization chart below, and each section is responsible for a specific part of the RCEME operation.

I work in the Entitlements sub-section of Technical Services, with WO2 'Reg' Weaver, S sgt 'Al' Wight, and S sgt Eric Goodman, under the direction of Captain Jules Klinec. We hold all the entitlement documents for every unit in the army, and every change in entitlement which affects the tools and equipment used by RCEME personnel passes through our hands.

Our work can be grouped under three main headings:

a. Keeping the entitlement documents up-to-date as amendments are published.

b. Finding information. For every change in entitlement which is requested we must check the part number, designation, price, existing entitlements, etc, of the item(s) concerned.

c. Writing letters. This is probably the most misunderstood aspect of the work.

There are only two reasons for writing letters in CFHQ: to ask other people what they want and why they want it; and, to tell other people what we want and why we want it. It's as simple as that.

Why must so many letters be written? For the same reason that most things in CFHQ happen so slowly, because there are so many people unavoidably involved in making any decision, and subsequently, in translating that decision into action, each of whom must know exactly what is going on and what has gone on. For instance:

A Request for a New Tool

If you come across a new tool and submit a request for it, the request comes to Entitlements in a folder, after having been through Area, Command, and another Directorate in CFHQ. We find the full details of the manufacturer's name, the price, part number, description, etc, if you haven't provided them all, and then we ask Maintenance Techniques sub-section, by letter, to try it out, to see if it's as good as you say it is. If it is, we then send the request, with another letter, to AD/MEE, or AD/EEE, to see who should get the tool, and then perhaps to DD/PTO to see if they want any at the School for training purposes.

When it comes back to us we check which documents have to be amended to include the tool, calculate the total requirement, and the total cost, and then include all this information in a letter to the Directorate which co-ordinates entitlement changes. By this time, six months may have gone by since you submitted the request.

The request may then be sent to several other Directorates for comments on such things as: Is there room for this in the vehicles of field units? Is the equipment on which it is used going to be in the army for some time? Is there enough money available to buy it (even a $25 tool may involve a total expense of $3000), and of course, it may come back to DEME for more information on why we want it. This may take another six months.

Even when the request has been approved, the tool must be given a catalogue number and a military designation, purchasing arrangements must be made, and entitlement documents published. It's easy to see why two years may elapse between your sending in a request and getting the tool.

The same procedure must be gone through for tooling for new equipment such as the M113A1, with the added difficulty that more tools are involved, and not even the manufacturer knows precisely what tools will be needed to do all the repairs that may be necessary.

The Rest of the Directorate

The work of the rest of the Directorate could be reviewed in a similar manner, I suppose, but I'm not qualified to do it. I've seen where the EFRs, Time Accounting Returns, etc, go when they get here, and I know the WOs and NCOs who work on them, but just precisely what they do with them I haven't found out, yet.

This brings up a point though, that I hadn't realized before I came here. Naturally, the officers in all sections direct the work, accept the responsibility for it, and do a lot of it themselves; but a great deal of the work, particularly in the technical sections, is done by the WOs and NCOs. In many, many cases, they make the recommendations on which the decisions are based, and in these cases it's not the "wheels" you have to convince in your reports and requests, it's the WOs and NCOs, initially anyway.

This is not as easy as you might think, even on technical matters where you would expect them to be sympathetic. After a year or so here, workshops and tools begin to seem a bit remote. They are no longer places and things, but numbers on bits of paper. Even a workshop in which one has spent some time, changes over the years, and one's memories of local conditions are not always accurate. Changes take place in equipment and working conditions with which one has no experience. This, I think, is why the "information vacuum" mentioned by Captain Rosson in his article on EFRs is so serious.

The point made by Captain Rosson in that article is worth re-emphasizing. A continuous flow of information to Ottawa is essential "to help keep RCEME on top of the repair job"; and for the above reason it should include all the background information you can think of. Again, as he says, "There are no art critics in DEME", neither are there any literary critics. The main requirements are CLARITY and SPEED. The sooner you get information to us, the sooner we can do something for you.

Conclusion

As I started out to say, working in DEME is both interesting and frustrating; but above all, it is instructive.

"Those people in Ottawa" will never again appear as awesome to me as they did before I came here. I shall know who gets my reports, requests, etc, and who reads them, and I'm sure that wherever I may be in the future, I shall always be a little more sympathetic with DEME's problems, particularly when I'm trying to get DEME to help me with mine.

Editor's query: What is the fastest orthodox way to obtain urgently required tools?

Answer: Send a wire to DEME detailing the tools required and requesting Temporary Issue. Affirm that a "97-1" is following by mail.

Follow up immediately with a well-substantiated "97-1", confirming the request for Temporary Issue pending approval of entitlement.

Temporary Issue may be granted on DEME's recommendation if the tools are already in the system and a stock is held by RCOC.

This procedure should only be used in cases of real urgency.

P. S. In case I've misled anybody, I said "up to two years". The average is more like 3-5 months for a "good" request.

-PJ

who's where

LOCATION OF RCEME WARRANT OFFICERS

As of 15 Feb 65

Class 1

Baynes	CH	CBUE
Boshier	R	27 COD
Brennan	RS	RCEME School
Brown	AT	10 Coy
Brunton	AC	14 Coy
Buck	WM	14 Coy
Cozens	SD	RCEME School
Crane	CE	HQ Camp Borden
Dagenais	EJ	AEEE
Deans	AG	13 Coy
Dodds	TH	RCEME School
Doherty	E	202 Base Wksp
Drew	CV	AEEE
Drobot	W	5 Coy
Dudley	J	D Org
Elliott	WEC	10 Coy
Fox	HR	AEEE
George	AG	202 Base Wksp
George	LJ	FGH
Gladwin	CH	CADEE
Guilfoyle	ME	RCEME School
Hanash	J	8 Coy
Hayes	JW	DEME
Henry	JE	11 Coy
Houlton	VH	DEME
Hurd	LR	202 Base Wksp
Jackson	AF	DEME
Jackson	O	RCEME School
Keech	HL	DEME
Knight	RA	SAS List
Knowles	GA	RCAC School
Landry	JL	Que Comd "I" Staff
Lee	KA	202 Base Wksp
Leon	BU	HQ Sask Area
Leonard	WV	14 Coy
Lewis	CB	11 Coy
Lewis	SM	13 Coy
Lowry	LH	DEME
MacDonald	DJ	DEME
Mallett	JC	AEEE
McInnes	DM	4 Coy
McMurchy	WS	DEME

Class 1

Meloche	JB	56 Cdn Inf Wksp
Mercer	JL	RCEME School
Munroe	GW	7 Coy
Neil	T	2 Coy
Norbury	G	13 Coy
Oakes	GAM	DEME
Owen	LR	RCD
Parker	JC	27 COD
Richardson	W	202 Base Wksp
Rivers	AM	RCEME School
Robertson	WG	3 Coy
Rowe	AW	RCEME School
Rutherford	FA	CJATC
Shaw	JE	DEME
Sherman	CG	DCER
Silzer	J	RCEME School
Sinclair	L	C Ont Area "I" Staff
Snell	JD	AEEE
St Pierre	G	LdSH (RC)
Stever	JD	AEEE
Stewart	RH	RCEME School
Stringer	AJ	1 Fd Wksp
Szumlanski	J	2 Fd Wksp
Thivierge	AJ	AEEE
Thomas	GA	DEME
Walsh	IS	4 Fd Wksp
Warren	DH	202 Base Wksp
Weston	ET	AEEE
Wilkinson	EJ	202 Base Wksp
Wilson	RR	6 Coy
Young	RD	SAS List

Class 2

Ablett	JA	DEME
Adams	RJM	RCEME School
Allen	EB	10 Coy
Allen	JJ	202 Base Wksp
Allen	WG	1 Fd Wksp
Almey	B	56 Inf Wksp
Anderson	JS	202 Base Wksp
Anderson	SB	RCEME School

Class 2

Armstrong	RWF	EBS Bn
Arscott	NL	RCEME School
Ashdown	GG	202 Base Wksp
Atwood	FH	14 Coy
Babb	CH	DEME
Bailey	E	27 COD
Baldwin	TW	202 Base Wksp
Balmer	AJ	10 Coy
Barker	NG	RCSA
Barrett	GJ	RCEME School
Barrey	WGA	202 Base Wksp
Bateman	NFK	1 CIBG
Beeson	EG	202 Base Wksp
Bellefontaine	AEL	6 Coy
Blackmore	HE	RCEME School
Blanchette	EEJ	3 R22R
Boisvert	L	5 Coy
Boon	J	SAS List
Both	TA	13 Coy
Bottle	DA	1 Coy
Bouchard	JM	RCEME School
Bovey	ET	3 CIBG
Broomer	TF	RCEME School
Brown	AW	10 Coy
Brown	RG	8 Coy
Burgess	EW	7 Coy
Burnette	JH	27 COD
Burns	HS	4 Coy RCASC
Cameron	FR	2 CIBG
Cameron	WE	10 Coy
Campbell	DN	RCEME School
Carefoot	WN	202 Base Wksp
Carver	AE	RCEME School
Cassidy	GP	RCEME School
Celli	AJ	202 Base Wksp
Christensen	AJ	27 COD
Clarke	AL	1 Fd Wksp
Clooney	RT	RCEME School
Coles	JC	11 Coy
Colson	AR	3 Coy
Coughlan	GH	2 Fd Wksp
Coughlin	AF	2 Fd Wksp
Cross	FT	13 Coy
Crosson	JH	2 Tpt Coy RCASC
Cunningham	JM	4 Coy
Dainty	WH	8 Coy
Dance	GN	RCEME School
Dand	RJM	4 Tpt Coy RCASC
Davis	WE	RCEME School
Dewar	J	DEME
Dillon	JB	202 Base Wksp
Dinner	A	2 Fd Wksp

Class 2

Dorey	EE	RCD
Drake	EA	6 Coy
Dyck	D	2 R22R
East	SW	2 Coy
Elliott	BD	202 Base Wksp
Eno	JB	14 Coy
Evans	RL	10 Coy
Fairchild	R	3 Coy
Fairfield	LR	10 Coy
Feller	DH	4 Coy
Ferguson	HG	1 Cdn Gds
Fielding	C	27 COD
Foley	HEF	3 RCHA
Fourcaudot	C	5 Coy
Fryer	JWA	7 Coy
Gall	GJ	CADEE
Gavriloff	W	AEEE
Gibbs	BF	14 Coy
Gill	DE	AEEE
Goss	RB	1 RCHA
Greenshield	W	4 CIBG
Grible	DL	27 COD
Griffin	GW	3 Coy
Halliday	AG	4 Fd Wksp
Hardy	JR	4 Fd Wksp
Harper	JM	RCEME School
Hasler	HJ	202 Base Wksp
Haugen	RG	56 Inf Wksp
Hennessey	RF	RCEME School
Henry	CR	11 Coy
Hewisson	RW	1 CIBG
Hill	LJF	CJATC
Hinton	WG	RCEME School
Holt	JS	4 A Tk Coy
Hooper	TC	4 Fd Wksp
Janssen	MEJ	202 Base Wksp
Jodoin	LH	RCEME School
Johnson	GM	RCEME School
Johnson	GT	ATOB
Johnson	WA	7 Coy
Johnstone	T	4 Coy
Jones	HR	FGH
Joyner	EF	2 Fd Wksp
Keating	EA	1 Fd Wksp
Kelly	M	SAS List
Keogan	MJ	AEEE
Kirkpatrick	AM	8 Coy
Konzuk	A	1 Fd Wksp
Kraemer	KE	RCEME School
Krupp	HH	4 Fd Wksp
Kutyick	J	CBUE
Lasuta	W	202 Base Wksp

Class 2

Lannan	FX	2 Coy
Lawrence	BJ	11 Coy
Leon	GR	1 Fd Wksp
Lewis	FA	1 QOR of C
Lewis	LH	202 Base Wksp
Little	JE	202 Base Wksp
Loven	KD	202 Base Wksp
MacDonald	CW	CJATC
MacLean	CB	CADEE
MacLellan	EB	202 Base Wksp
MacLeod	D	5 Coy
Mahood	NEH	CJATC
Main	T	1 Fd Wksp
Mandeville	E	3 R22R
Manning	RW	LdSH (RC)
Marin	EW	2 CIBG
Mason	J	14 Coy
Mason	RAH	202 Base Wksp
Maxell	AC	2 Fd Wksp
McBlane	AG	Alta Area 'I' Staff
McCormack	CB	7 Coy
McDonald	DW	C&D Estb CAS(W)
McDow	KA	AEEE
McElroy	JC	14 Coy
McGovern	PMJ	DEE
McIntyre	WA	27 COD
McLaughlin	WE	2 Fd Wksp
McLeod	HAT	RCEME School
McLeod	MH	DEME
Measor	HD	HQ 4 CIBG
Melvin	GR	202 Base Wksp
Milne	HC	EBS Bn
Molnar	LA	DEME
Monkman	WWB	RCEME School
Moore	WE	DEME
Munday	AC	10 Coy
Myatt	WC	EBS Bn
Nelson	WJ	8 CH
Newell	GS	HQ RCEME Wescom
Neudorf	I	HQ Man 'I' Staff
O'Grady	CL	202 Base Wksp
O'Rourke	WW	C Ont Area 'I' Staff
Orme	JI	RCEME School
Patterson	MP	9 Tpt Coy RCASC
Pennie	FM	11 Coy
Perrier	LG	202 Base Wksp

Class 2

Perrin	WG	202 Base Wksp
Phillips	EW	RCEME School
Pineo	MC	EBS Bn
Pirt	KMC	4 Fd Wksp
Press	J	AEEE
Price	EC	4 Fd Wksp
Proud	VS	27 COD
Rawling	GW	D Pers RCEME
Reid	FL	202 Base Wksp
Rhodes	AP	27 COD
Richardson	PH	56 Inf Wksp
Robertson	DW	1 Tpt Coy RCASC
Rodd	EL	CADEE
Ronan	JM	DEME
Russell	MM	13 Coy
Schleihauf	GH	C&D Estb CAS(W)
Sedger	CA	11 Coy
Seeley	HR	HQ Cencom
Sheldon	ND	202 Base Wksp
Simpson	WG	2 Coy
Smith	J	202 Base Wksp
Smith	L	4 Coy
Smith	NC	DEME
Smyth	WC	27 COD
Sochasky	CN	C&D Estb CAS(W)
St Germain	NJ	DEME
Stewart	GG	202 Base Wksp
Starbo	RM	13 Coy
Summerfield	JW	10 Coy
Taylor	CE	4 Fd Wksp
Taylor	JF	1 Fd Wksp
Thibaudeau	AE	202 Base Wksp
Thomas	R	3 CIBG
Thompson	TAE	202 Base Wksp
Thorne	J	202 Base Wksp
Trattles	EW	1 Tpt Hel Pl
Trinca	JL	1 RCR
Walker	J	1 PPCLI
Weaver	CR	DEME
Whitehead	TG	4 RCHA
Wild	EB	13 Coy
Wood	WJ	2 RCHA
Woodrow	JA	6 Coy
Wright	EO	RCEME School
Wright	EG	HQ Eascom
Young	RJ	11 Coy

On Monday night the Fort Chambly Huskies defeated the Engineer Beavers 9-1 in an exciting game at the "Home of the Huskies". Those from the workshop scoring goals were Perrault 2 and Lesage 1.

On Jan 19 word was received that Sgt Fred Borden hadpassed pre-artificer assessment, was posted back to CJATC, Rivers, and was to be in Fort Eustis, Virginia, by Feb 19.

-The Beaver